September 27, 1943

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1982

TECHNOLOGY DEPT.

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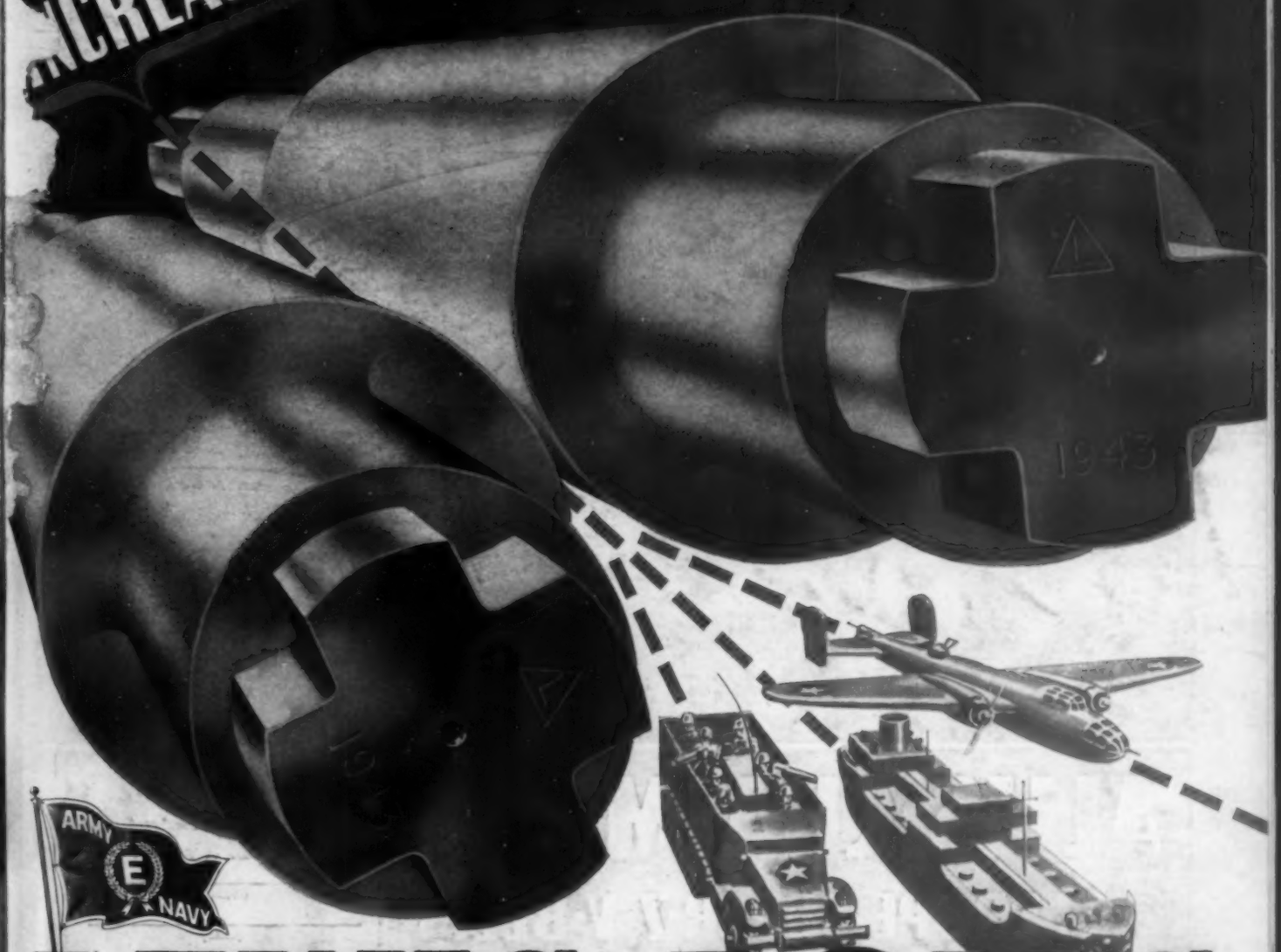
SEP 25 1943
DETROIT

BETTER FINISH
INCREASED TONNAGE

Steel Mill operators rely upon the dependability of Lewis Rolls and Rolling Mill Machinery to help them speed up quality and quantity of production.

LEWIS FOUNDRY & MACHINE
DIVISION OF BLAW-KNOX CO.
PITTSBURGH, PA.



LEWIS ROLLS

HERE'S NEW Double-Trouble for V-Belt Wear!

1

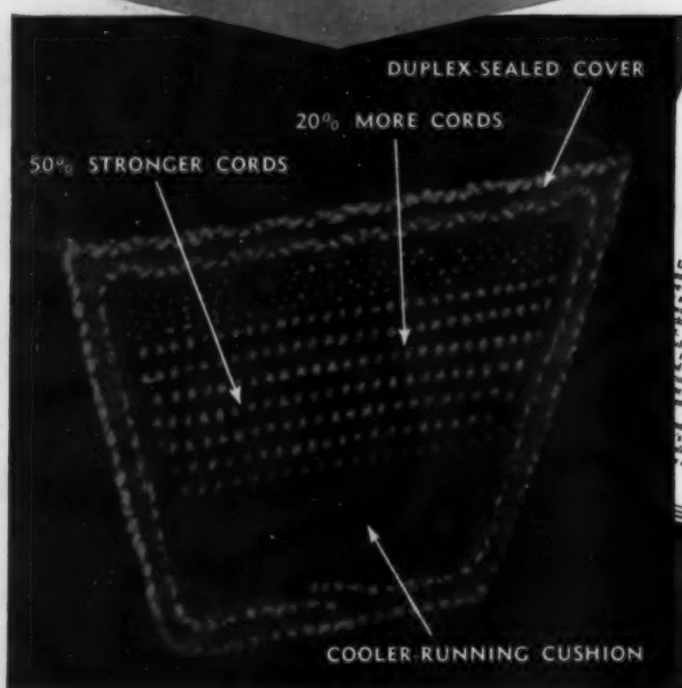
BUY THE BEST BELTS:

You'll get the "jump" on maintenance with Texrope Super-7's design-against-wear construction! 20% *more* pulling cords. 50% *greater strength* in every one because they're made by the special Flexon process. That adds up to extra pulling power, less stretch. A cool-running rubber cushion fights flexing heat. Tough Duplex-Sealed cover seals belt against grit, grime, and moisture. When you *do* need new belts *invest in the best* — Texrope Super 7!

2

USE THE BEST CARE:

Over 75,000 men in industry are getting a head start on longer V-Belt life because they've got Allis-Chalmers' new handbook: "Plain Facts on Wartime Care of Rubber V-Belts." It gives you the inside story on "how V-belt anatomy affects maintenance"... "good-rule-of-thumb for tension"... a lot of other tips. Excellent for training new men, it's packed with valuable data. For your *free* copy, tear off the coupon and send today.



ALLIS-CHALMERS

TEXROPE SUPER-7 V-BELTS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

Trade mark registered U. S. Patent Office. Texrope Super-7 V-Belts are the result of the cooperative research and design genius of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by Allis-Chalmers. Available in all sizes.

ALLIS-CHALMERS MFG. CO.
Milwaukee, Wisconsin

Gentlemen:

Yes, I would like to receive free of charge a copy of your "Plain Facts on Wartime Care of V-Belts".

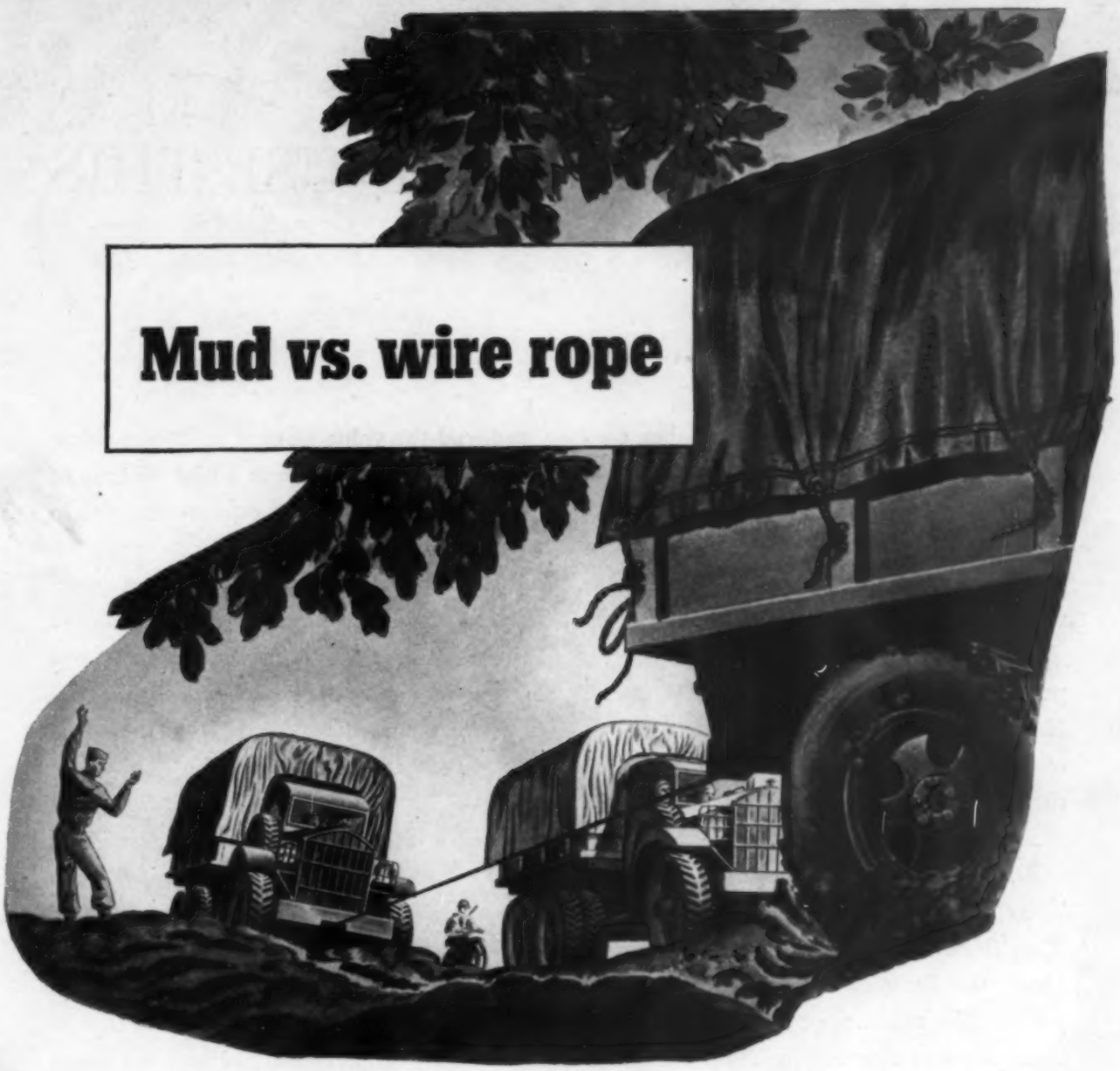
(Name) _____

(Title) _____

(Company) _____

(Street Address) _____

(City and State) _____ A 1628-11



Mud vs. wire rope

We can't stop the rains, but we *can* provide a means for pulling stalled jeeps, trucks and tanks out of the clutches of that obstinate and gluey old campaigner, General Mud.

Bethlehem's wire rope mill is producing many thousands of emergency winch cables, carried as standard equipment on trucks and tanks. We make up these cables complete, with fittings and hooks all ready to be used. Millions of feet of Bethlehem wire rope have already gone into this service.

Bethlehem Manufactures Wire Rope for all Purposes

THEY COULD USE THIS

THAT HALF-TRACK can be mighty useful, on a farm or construction job. It can save time and back-breaking work, in a hundred and one ways. The men in our armed services realize it. They're waiting for a chance to use it, back home.

OTHERS SEE the utility of planes, jeeps, powerful trucks for peacetime pursuits. Homemakers will clamor for better equipment for comfort and convenience. And they'll have the money to buy, invested in War Bonds or otherwise.

BUT they'll be cagey shoppers, we think. They won't be satisfied with the old. They'll be looking for manufacturers to apply the lessons of war to peacetime goods. The pressure now is for deliveries. The postwar demand will be for more over-all utility, at a fair price.

WE DOUBT that this country's present machinery will do the job. Much of it is years old, depreciated even before the War. Heavy loads and long hours have reduced the value of new machines. New developments will cause a high degree of obsolescence, even of equipment still in good order.

SO, the manufacturer will be a jump ahead of his competitors, who starts now to study his postwar facilities. He'll find out what machinery he can use, what is outworn or outmoded. He'll plan to use the most productive machinery he can obtain.

TAX AUTHORITIES CAN HELP, by considering the rapid rate of depreciation and obsolescence, and by permitting the reservation of "seed money" so that funds will be available when new equipment is obtainable.

WE SHALL LOSE MUCH of the value of our native ingenuity if we are not ready to apply it to peacetime pursuits. Only the production of more goods for more people, by means of modern machinery, can bring us work, contentment, and lasting freedom.

THE MONARCH MACHINE TOOL COMPANY • • • SIDNEY • OHIO

MONARCH LATHES

Cover the Turning Field

back on the FARM

BEHIND THE SCENES

Double Duty

■ H. F. Wittee of the Scullin Steel Company timekeeper's office tells this one about an enthusiastic worker: A 17-year-old youth, a machinist's apprentice, punched the clock at 7 a.m., worked his regular shift until 4 p.m., then went home. Time records revealed, however, that he returned at 7:56 p.m. the same day and left again at 8:01 p.m.—only five minutes later.

His sheepish explanation was that he went to sleep in his hotel room after his regular shift, but soon awakened and, believing he had overslept, rushed back to work!

News From Iran

■ By air mail last week came a letter which had been on its way a long time. Mailed in Teheran, Iran June 14, 1943, it had probably seen a lot of this world in a little more than three months.

And just as interesting as its journey was its contents:

Having obtained a copy of your magazine and finding it interesting, we beg to say:

As the Mediterranean will be open and the war, we hope, will soon be finished we are going to renew business with America as soon as possible. We shall, therefore, be much obliged if you will give our address to your clients asking all those who, at the present, are in a position and interested to export to send us catalogs together with their best prices and terms cif Iran ports.

Being general merchants and commission agents we are interested to deal in any kind of products which can be forced in our market, and are ready to consider any dead-stocks offer. Our company has recently been reformed, with a nominal capital of Rials 300,000 and registered in Government's Registration office as "Tazamoni", i. e. each member is responsible for all eventual debt of the company. The personal property of the three partners amounts to at least Rials 3,000,000.

Awaiting good business in future by your kindness.

M. E. Lobnan, Manager
Lobnan & Co., Teheran, Iran

We're sorry to say we don't know how much a Rial is, but if you have an eye cocked toward foreign markets after the war you may well want to get in touch with Mr. Lobnan.

Editorial Achievement

■ At the September meeting of the Industrial Advertisers Association of New York awards for editorial achievements by business papers were made by G. D. Crain Jr. in behalf of the magazine *Industrial Marketing*.

A physical examination this week clearly reveals that STEEL's chest measurement is up a full inch or more, because with considerable pride and pleasure our New York office contingent was on hand to watch Mrs. E. C. Kreutzberg, wife of Editor Ed, accept for STEEL the Award of Merit from Mr. Crain for the series of articles on the Development and Successful Application of NE Alloy Steels.

The award came under Classification I for the best series of articles or editorials appearing in the business press during the year ending July 31 and was one of a number presented by *Industrial Marketing* in connection with its sixth annual editorial competition.

Reassuring To Know . . .

■ With arrangements just completed for John W. Welles, Inter-Agency Staff, Conservation Division, WPB, to receive STEEL regularly each week, he writes:

We have always checked STEEL'S pages carefully each week in evaluating the criticalness of the ferrous group for Material Substitutions and Supply List, and it is reassuring to know that now the latest issue will come straight to my desk.

100 Per Center

■ There have been all kinds of tales of Americana in the papers since the 3rd War Loan drive has been on but none compares with the story of Frank Beech, 69-year-old lathe operator at H. K. Porter Co. Inc., Pittsburgh. For the duration he has assigned 100 per cent of his wages—his entire pay envelope—to war bonds.

Several years ago Beech retired to live on royalties derived from a patented water softening device he helped develop. But when the war came he quit his retirement, took a school course in lathe operation and secured his present job which he intends to hold until American production brings victory.

Seasick Machine

■ If you've ever been seasick you will readily attest to the fact that it ain't no fun and hardly improves your physical efficiency at the moment. Because seasickness can be really serious to amphibious troops about to land on enemy shores, Lt. Col. L. L. Barrow, Command Surgeon of the Engineer Amphibian Command, recently set out to find a remedy for the malady. His first approach was to invent and develop a "Seasick Machine" to study the effects of a rough sea on different individuals.

The machine produces the three basic motions of the sea, pitching, rolling and yawing. It resembles a seesaw with a frame approximately 15 feet long supported at its center by an 18-inch square pedestal which is 30 inches high. At each end of the frame are seats enclosed by removable, ventilated hoods. Each of the three motions is accounted for by a variable speed motor and countered by either a leaf or coil spring.

So there you are, in case you want to take a comparatively cheap and easy world cruise these days. Just build yourself a seasick machine, get some good travel books, have your friends send you a nice basket of fruit and hop aboard. *Bon voyage!*

Vol. 113, No. 13, September 27, 1943, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 37

RAMIX is helping make that extra two million tons

Installing front wall of an All-Ramix hearth by ramming behind form. No skilled labor required.

EVERY day, in many ways, Ramix helps open hearth and electric furnace men to "keep 'em rolling"... to make that extra steel the war agencies are calling for.

That Ramix saves time in new hearth construction is well known. It is the usual thing to complete a Ramix hearth a week to 10 days sooner than one of conventional magnesite. This means 10 to 15 extra heats... 2,000 or more extra tons of steel, in a 200-ton open hearth.

Ramix also is helpful in hearth repair and maintenance. Nearly any furnace man can name instances where he has made quick, dependable repairs with this material. For example, in one shop, whenever a furnace is down, a man goes over the banks with a prod and picks out pieces of metal. The holes are rammed with Ramix. The hearth is kept sound and safe and the delay time substantially reduced.

Every superintendent will find a dozen or more ways in which this chemically-bonded, cold-ramming magnesia refractory can be used to advantage. Basic Field Engineers suggest uses, too. Busier now than ever, these service men are never *too* busy to lend you a hand when you want help or advice on basic hearth refractories. We're in this with you to make that extra steel for the 1943 goal.

BASIC REFRACTORIES, INCORPORATED
CLEVELAND, OHIO

The welded rings shown here are manufactured by the American Welding and Manufacturing Company, Warren, Ohio, from sections and bars of N-A-X Alloy Steel, produced by Great Lakes Steel Corporation.

This application is one of hundreds today in which the unusual properties of N-A-X 9100 Series Alloy Steel are being utilized in the production of ordnance equipment, where standards are high and specifications exacting.

If you have need for a High Tensile steel—or a carburizing steel—or a medium and deep hardening steel—it will pay you to investigate the properties of N-A-X 9100 Series of Alloy Steels.

DUCTILITY
ITS INHERENTLY FIBER GRAIN MAKES ALL THE DIFFERENCE
STRENGTH

Send for your copy of a new booklet describing these steels. It's yours for the asking.

GREAT LAKES STEEL CORPORATION
Detroit, Michigan
Sales Offices in Principal Cities

NATIONAL STEEL CORPORATION

Division of
NATIONAL STEEL CORPORATION
Executive Offices · Pittsburgh, Pa.

Koroseal tank linings—available for essential installations

Koroseal is a typical example of B. F. Goodrich development

THE tank in the picture is one of six handling nitric and hydrofluoric acid at 150°F in a continuous operation pickling stainless steel. In such installations tanks of heavy timbers often lasted only 5 to 7 months; with elaborate care and frequent repairs could sometimes be used for two years. These steel tanks have linings of Koroseal, brick sheathed. After almost three years a recent inspection showed not the slightest damage, no deterioration of the Koroseal—they are apparently as good as new. In these years of hard wartime use there has never been a single leak, nor a penny spent for repairs, nor a moment's delay caused by the tank.

Engineers familiar with this installation say no other lining could have stood up so well for so long, and that the Koroseal lining is good for years more.

Koroseal is still a restricted war material but is available for many essential industrial uses. If you have any problem in tanks or tank linings or other handling of acids or other corrosives, or any questions about them, write us. Koroseal can be compounded to meet many special acid conditions. And if you buy Koroseal-lined tanks they'll be engineered, made and installed by B. F. Goodrich engineers with more successful experience in tank linings than any other company can offer you. *The B. F. Goodrich Co., Industrial Products Division, Akron, Ohio.*

Koroseal—Reg. T.M.

B.F. Goodrich

RUBBER *and* SYNTHETIC *products*

St. Joe electric shovel operating in a St. Joseph Lead Co. mine in Missouri

LEAD — The Preserver of Steel

Lead is one of the few metals now available.

Steel is in tremendous demand for wartime needs.

Lead's greatest strength is its ability to withstand corrosion.

The "Achilles' Heel" of steel is its poor defense against rust.

It is logical to protect the critical material with an available metal which can supply that protection.

Today, lead protects steel not only as a paint pigment, but as a metallic coating.

Pole-line hardware is now given a hot-dip coating of lead.

At least two important steel companies are now producing lead-coated steel sheets:

The Continental Steel Corporation, Kokomo, Indiana;
The Weirton Steel Company, Weirton, West Virginia.

The property of lead which enabled a lead pipe to withstand the elements for 1800 years, is now recognized as armor for the "Achilles' Heel" of steel.

ST. JOSEPH LEAD COMPANY

250 PARK AVENUE • NEW YORK • ELdorado 5-3200

Lead	*Zinc Oxide*	*Antimony*
Zinc	*Antimonial Lead*	*Cadmium*

THE LARGEST PRODUCER OF LEAD IN THE UNITED STATES

NATIONAL METAL CONGRESS *and* WAR CONFERENCE DISPLAY

WALK IN

FOR THE ANSWERS TO YOUR PROBLEMS

YES—you will find the answers to many production problems at the War Conference Display rooms* that will feature the National Metal Congress in Chicago's Palmer House the week of October 18.

Many scores of manufacturers have taken these conference-display rooms to promote the aim of this great meeting of the metal industry—"Increased Production of War Products, Conservation of Materials, and Postwar Planning".

Thus, in addition to scores of technical sessions and the practical A.S.M. War Production and Conservation Sessions, you may discuss your problems in person with leading executives—you may gather dozens of ideas—simply by visiting these convenient rooms on the 7th, 8th and 9th floors of the Palmer House.

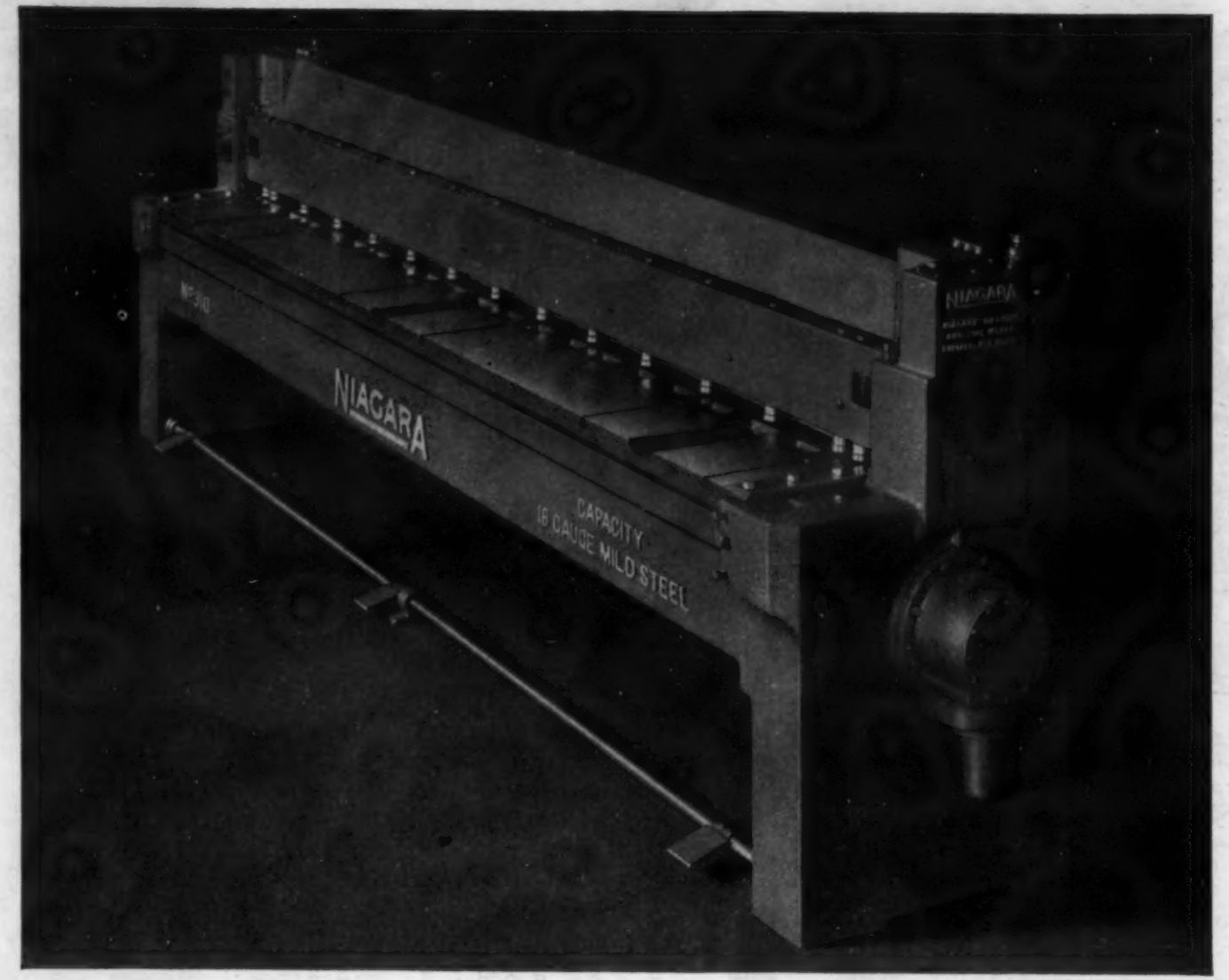
So make your plans now to attend this 25th annual Metal Congress.

★ ★ ★ ★ ★

**Note to Manufacturers* — Several excellent room locations for display and conference are still available. Thousands of metal men will attend this biggest of all metal events. This is your opportunity to talk with customers and prospects, to help them with their problems, to discuss postwar plans. Get complete information now by writing or wiring the American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio.

NATIONAL METAL CONGRESS AND WAR CONFERENCE DISPLAY

Under the direction of the American Society for Metals, in cooperation with the American Welding Society, the Wire Association, and the Institute of Metals and Iron and Steel divisions of the American Institute of Mining and Metallurgical Engineers.



★

This Series No. 3 Niagara Power Squaring Shear is typical of the many sizes and capacities which are resulting in more production per hour. The Niagara line of shears is the most complete in the industry and offers the most economical answer to shearing requirements up to 20 feet. Niagara Machine & Tool Works; Buffalo 11, N. Y. District Offices: Detroit, Cleveland, New York.

Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory regrinding service by the same skilled men who grind new Niagara knives.

BUY UNITED STATES WAR BONDS AND STAMPS

—Advt.

PLANTS IN: ST. LOUIS, MO. • PITTSBURGH, PA. • MEADVILLE, PA. • JERSEY CITY, N. J. • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

Since every available ounce of Tungsten has been claimed for essential war use, and since the rule is that something else must be made to serve wherever possible, therefore very little could be helpfully said in recent months about the values of Tungsten. Yet Tungsten was never so important. We do well to remember that this standard alloying element has been withheld from some uses only because for other uses it is indispensable. And it is timely to note that the severest restrictions have now been a little relaxed. A better balance between need and supply has brought this about. When happily we all pass again from the economy of war to the economy of peace, unhampered use of Tungsten will be one of many advantages regained.

Inquiries concerning the availability or the metallurgical behavior of Tungsten, Molybdenum or Boron will be welcomed by the Molybdenum Corporation.

AMERICAN Production, American Distribution, American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.

MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

TIME . .

a modern manufactured product

There is nothing we can do which will increase the number of seconds in an hour—or the number of hours in a day—but we *can* make each second and each hour more productive.

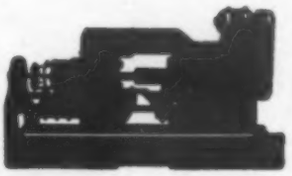
In that sense, Acme-Gridley Automatics actually manufacture *time*—by producing more.

In war production, time saved is important because it means quicker delivery of the tools and equipment that win battles.

In postwar production, time saved will be equally important, through its effect on the *cost* of finished goods.

It is also important to remember that production with Acme-Gridleys may be speeded up to the limit of what tools will stand without any sacrifice of precision or uniform high quality.

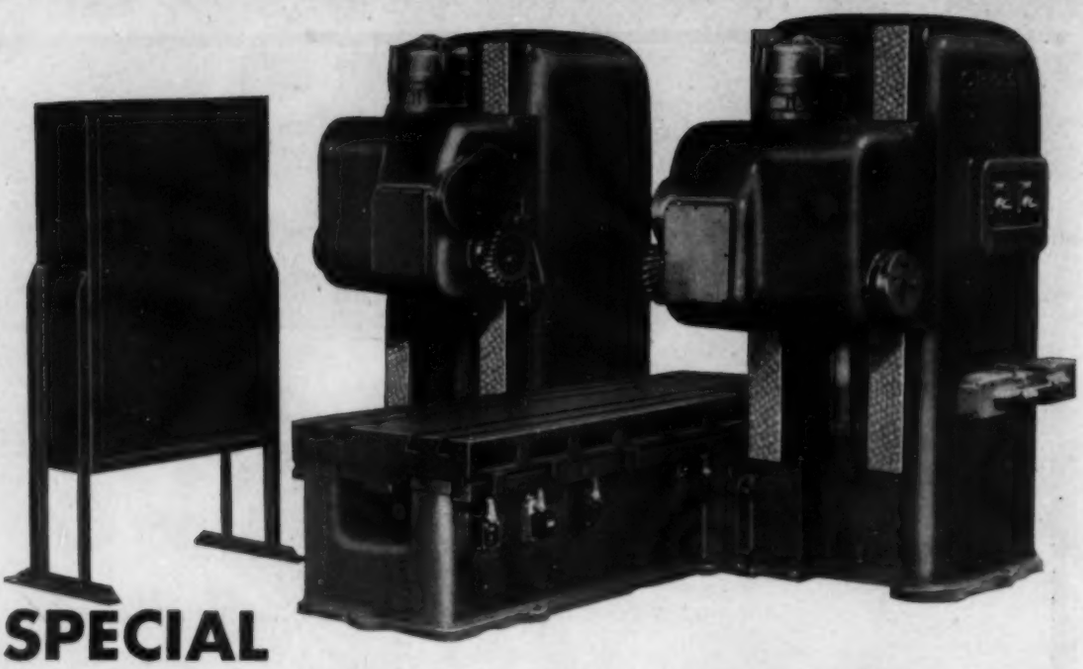
Better goods to sell—at lower prices—will be a sound basis on which to enter postwar markets, at home and abroad—a basis that Acme-Gridleys will help to establish.



ACME-GRIDLEY AUTOMATICS maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

The NATIONAL ACME *Company*

CLEVELAND • OHIO

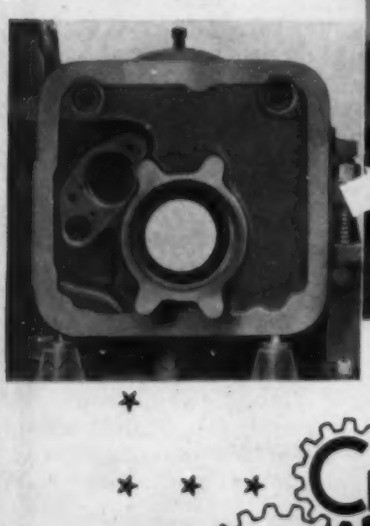


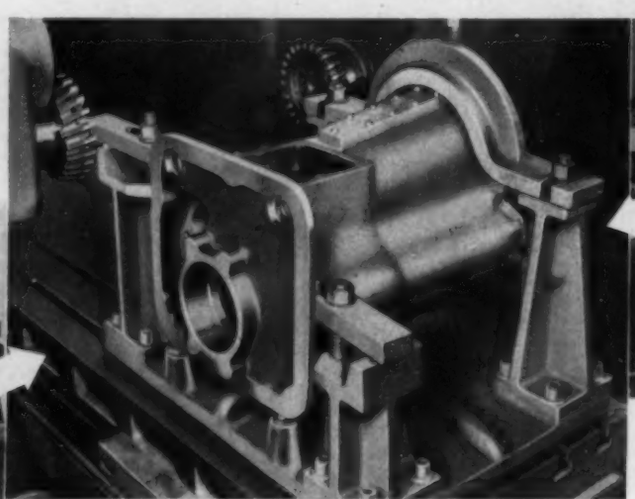
Available in combinations including: any width and length of table and bed, one or more side columns and heads, cross rail with one or more heads containing vertical or angular spindles.

CROSS SPECIAL
Automatic Duplex Miller

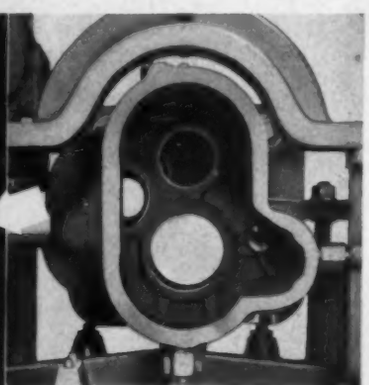
Modern production shops are achieving noteworthy results with the Cross Automatic Miller on diversified classes of work. Hydraulic feed and rapid traverse, with independent electric controls for each head and the table, provide a means for quick set-up and assure a range of flexibility to meet the most exacting requirements. Each head is a self-contained unit with individual motor drive, quill adjustment for the cutter spindle and pick-off gears for changing cutter speeds. The automatic operating cycle is an important contributing factor in maintaining volume production schedules with unskilled help.

One cutter finishes the irregular profile of the large flange, on the left end of the case, as illustrated below. Note the necessity of finishing between the stud bosses of the smaller flange.





On the cast iron gear box illustrated above—both ends, each entirely different than the other, are automatically finished at the same time and in one operation with the Cross Duplex Miller.



A second cutter finishes the irregular profile of the flange on the right end of the case, as illustrated above.

CROSS GEAR & MACHINE CO.

Established in 1898

DETROIT, MICHIGAN, U.S.A.

S-3

The Army is hollering for these sleds—we need steel—can you help us out?

WE COULD . . . WE DID . . . THE SLEDS WERE DELIVERED *on time!*

THESE GIANT SLEDS are capable of carrying 80 tons of material—60% more than the average freight car! They were made for the U. S. Army by a Wisconsin manufacturer. By furnishing materials just when they were needed, we helped this manufacturer meet a difficult production schedule—on time!

FILLING rush orders is nothing new to us. We've been at it for years. The only difference now is that we can't fill *all* the requests all of the time. For material shortages sometimes make it impossible.

But we're in business to help you get the steels you want if it is possible to get them to you. And every man in our nine big warehouses, from the man who takes the order to the man who ships the goods, is trained to remember that our business was built upon friendly, efficient service.

Do you need steel, steel products, tools, machinery, equipment? Call us. We've filled the bill for so many wartime manufacturers that there is a good chance we can help you, too. Write, phone or wire any of the warehouses listed below. They'll all give you prompt attention — do their best to help you.

UNITED STATES STEEL SUPPLY COMPANY
USS
STEELS
SERVICE

CHICAGO (90),	1319 Wabansia Ave., P. O. Box MM	BRUnswick 2000 Teletype CG. 805
BALTIMORE (3),	Bush & Wicomico Sts., P. O. Box 2036	GILmore 3100 Teletype BA. 183
BOSTON (34),	176 Lincoln St., Allston, P. O. Box 42	STAdium 9400 Teletype BRTN. 10
CLEVELAND (14),	1394 E. 39th St.,	HEnderson 5750 Teletype CV. 153
MILWAUKEE (1),	4027 West Scott St., P. O. Box 2045	Mitchell 7500 Teletype MI. 587
NEWARK (1), N.J.,	Foot of Bessemer St., P. O. Box 479 Teletype NK. 74	Bigelow 3-5920 HEctor 2-6560
PITTSBURGH (12),	1281 Reedsdale St., N. S.	BErgen 3-1614 CEdar 7780 Teletype PG. 475
ST. LOUIS (3),	21st & Gratiot Sts.,	MAin 5235 Teletype SL. 394
TWIN CITY,	2545 University Ave., St. Paul (4), Minn.	NEstor 2821 Teletype STP. 154

UNITED STATES STEEL SUPPLY COMPANY
(formerly Scully Steel Products Company)

UNITED STATES STEEL

EVOLUTION

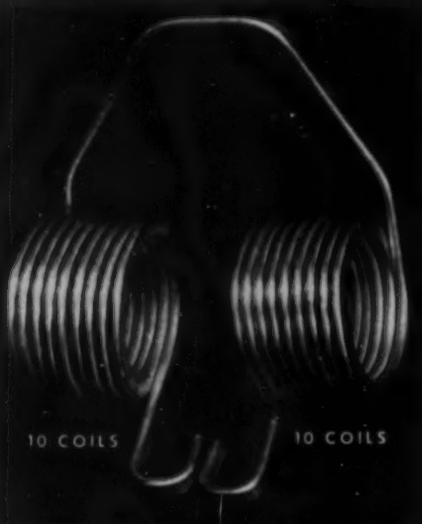
OF A

SPECIAL TORSION SPRING

REDESIGNED FOR QUANTITY PRODUCTION

This classic example of redesigning an important airplane spring to change from a very special spring (now impossible to obtain) to a standard type of spring is an every day occurrence in the Engineering Department of The Lee Spring Company, Inc.

ORIGINAL SPRING
SPECIAL DESIGN



DESIGN No. 1

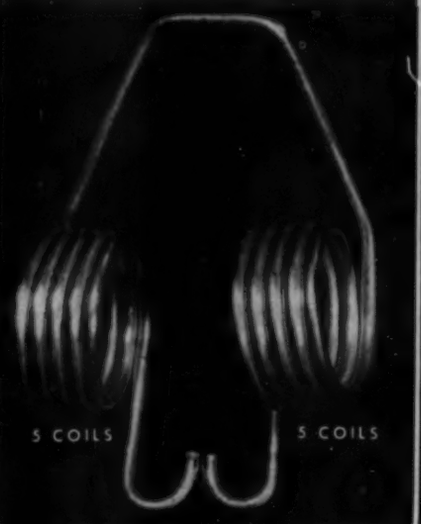
Used special alloy steel.

Used special rectangular section with round edges.

Used special looping that was difficult to manufacture.

Weighed ¼ pound each.

FIRST REDESIGN
(FOR QUICK EMERGENCY USE)



DESIGN No. 2

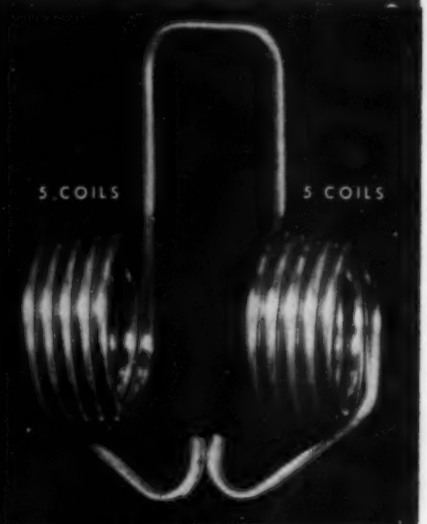
Used standard music wire steel.

Used standard round section of wire.

Used same special looping to ensure exact replacement in application.

Weighed ⅔ of original.

***FINAL* REDESIGN**
FOR QUANTITY PRODUCTION



DESIGN No. 3

Uses same standard wire as No. 2 but is made with a conventional inside loop to speed up production.

Weight ⅔ of original.

SAVING IN TIME=400%

Spring No. 1 of special design, material and section was in general use before the war. When such special springs could no longer be obtained, The Lee Spring Company, Inc., suggested redesigning to use standard material. An urgent request for a small quantity of springs, needed immediately for airplanes completely manufactured, was met by furnishing Design No. 2. But when the airplane manufacturer required quantities numbering many thousands and quickly it became necessary to "redesign for production" to reduce manufacturing time. All three springs exert the same inch pounds torque and do exactly the same job, fit the same application and are now performing for the war effort. . . . Solving your spring problems is our established profession and a modern series of bulletins our printed proof. We'll either tackle your individual problem or mail you the literature—both without obligation.

LEE *Spring Company,* INC.

30 MAIN STREET
BROOKLYN 1, N. Y.

LEE-BUILT TRADE MARK SPRINGS

THIS? A WAR WEAPON?

Remember the old-fashioned stereoscope — grandfather's substitute for the movies? Remember how it made pictures stand out in three-dimensional relief?

Well, the same idea is being used in stereoscopic airplane cameras today. Because stereoscopic pictures show up hidden depressions and hills that are not always apparent in the usual aerial photograph.

Grinding stereoscopic lenses, in fact, *all* highly-corrected lenses, is a delicate precision operation. In order to insure accurate measurements and to avoid uncontrolled expansion, lenses are tested in special *air conditioned* rooms . . . maintaining a constant temperature at all times.

Air conditioning is used similarly in making the famous Norden bombsight, in precision machining, and in many other industrial processes.

To do exacting war jobs like these, General Electric engineers have developed dependable air conditioning and industrial refrigeration equipment—equipment that had to be more efficient, more compact, and more flexible.

In the post-war period, the public will be enabled to buy not only new—but vastly improved air conditioning—from General Electric.

☆ BUY WAR BONDS ☆

General Electric Co., Air Conditioning and Commercial Refrigeration Divisions, Section 4310, Bloomfield, New Jersey.

Air Conditioning by

GENERAL ELECTRIC

Hear the General Electric Radio Programs: "THE HOUR OF CHARM," Sunday 10 P. M. EWT, NBC..."THE WORLD TODAY" News Every Weekday 6:45 P. M., EWT, CBS

CO COMES TO CARBIDE!

A NEW SERVICE TO FIRTHITE USERS

Firth-Sterling announces **"COLOR-BRANDING"** —a new way of marking FIRTHITE Sintered-Carbide Tips and Tools so that the user can determine the grade of carbide at a glance . . . clearly . . . unmistakably.

Eight different "colors" now appear on FIRTHITE unmounted Tips: red, white, blue, green, yellow, brown, black, purple.

These unmounted Tips reach the user already color-branded on the outer end. After brazing, the user simply paints on the tool shank the color that appeared on the **Tip** before it was brazed.

The handy FIRTHITE **Color Chart** is available to users on request. This chart is mounted for hanging on the wall. It is a quick-reference guide to the selection of FIRTHITE Sintered-Carbide Tips and Tools.

Firth Sterling Steel Company

OFFICES: McKEESPORT, PA. · NEW YORK · HARTFORD · PHILADELPHIA · CLEVELAND · DAYTON · DETROIT · CHICAGO · LOS ANGELES

8 Firthite Grades NOW "Color-Branded" FOR

QUICK, EASY, SURE IDENTIFICATION

(For fuller descriptions of these grades, see pages 10 and 11 of Firthite Users' Handbook—or consult a Firthite Engineer.)

HA

The peak-production carbide for finishing hard, abrasive irons, non-ferrous and non-metallic materials. Used for turning, facing, sawing, boring, and reaming.

TA

The general-purpose carbide for cutting all types of steel in high-speed production. TA machines both ferrous and non-ferrous materials, such as aluminum.

T-04

The heavy-duty carbide for coarse feeds, heavy and interrupted roughing cuts. Closest approach to a universal grade. Machines armor plate, softer steels, cast iron, etc.

T-89

The special-purpose carbide for rough turning shells, etc. Withstands shock and jump cuts. T-89 is resistant to corrosion, erosion, heat, wear, and chip cratering.

T-16

The super-speed carbide for light, rapid finishing of harder steels, shells, etc. T-16 is especially suited for "Hyper-Milling" of heat-treated alloy steels.

T-31

The precision-work carbide for lightest, fastest, shallow cuts on hard, alloy, and treated steels. Hardest, most wear-resistant grade for precision boring, etc.

HC

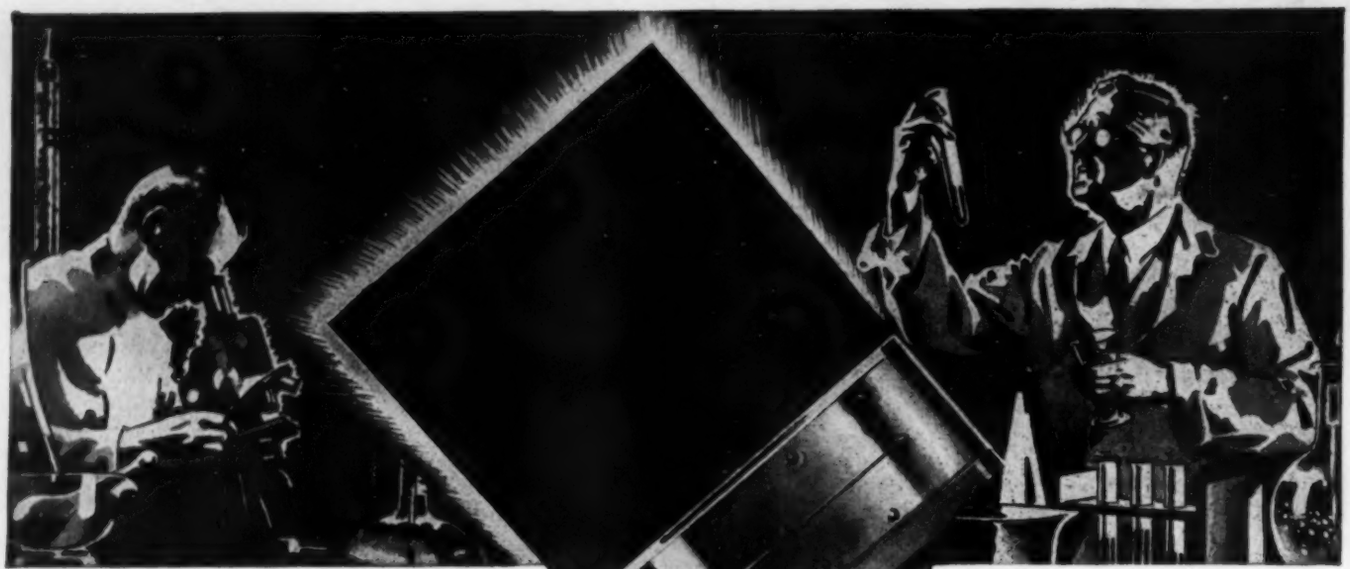
The carbide for hogging cuts on soft materials at slow speeds. Excellent for skiving brass and grooving aluminum-alloy pistons. Withstands impact, vibration, abuse.

H

The average-conditions carbide. Most dependable grade for general use in roughing softer metals and less abrasive non-metallic materials at moderate speeds.

Firth-Sterling Steel Company

OFFICES: McKEESPORT, PA.-NEW YORK-HARTFORD-PHILADELPHIA-CLEVELAND-DAYTON-DETROIT-CHICAGO-LOS ANGELES



After Years of Laboratory Work and Extensive Testing "Pittsburgh" Now Offers

NEOCETA*

SYNTHETIC BRISTLE BRUSHES

Comparable in Quality and Performance to Brushes Made with Pure Natural Bristle

"Pittsburgh" scientists started their experiments two years before Pearl Harbor.

They had instructions to continue their research work until they had developed synthetic bristle brushes which would be as efficient in performance as those made with the best natural bristles.

After three years, they have succeeded in meeting the specifications. As a result, "Pittsburgh" now offers America's first full line of synthetic bristle brushes. Repeated tests prove that these Neoceta brushes compare favorably with any pre-war brush you have ever used.

Everything You Ask for in A Paint Brush!

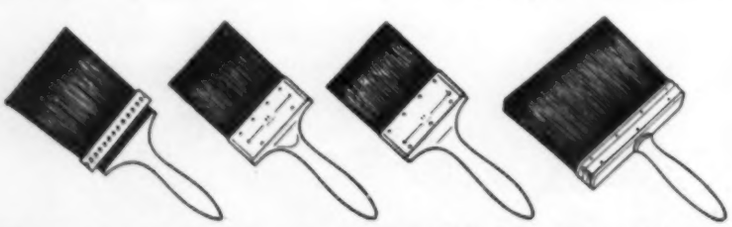
Neoceta brushes are highly practical and workable. Examine this bristle under a microscope and you will find that its taper is very similar to a natural bristle's. This allows paint to flow evenly and brush on smoothly. Neoceta brushes hold as much—*or more*—paint as pure bristle brushes and rival them in durability, spreading ability and the character of the film they produce. Here, in short, is a product that stands squarely on its own merits.

Availability

Winning the war comes first! Brushes of Neoceta are now available to the Army, Navy, or contractors for war materials for the Armed Services.

Bristle brushes, made and distributed in accordance with W. P. B. regulations, are also still available, with the necessary priority, through "Pittsburgh" branches everywhere.

**Trade Mark Reg. U. S. Patent Office No. 397,100*



PITTSBURGH PLATE GLASS COMPANY

NEOCETA brushes are manufactured by the creators of famous *Gold Stripe* brushes

This hand puts a finger on trouble

Try to elude this sensitive hand, you gremlins of vibration! You'll be caught—isolated—magnified as much as 1,600,000. times. And your measure will be taken.

The pre-testing of high-speed rotating parts is but a simple meter reading with Gisholt Dynetric Balancing Machines. It's done in a few seconds—the most important seconds in the life of any rotating part. For it is here that unbalanced forces are eliminated to prevent vibration, noise, and excessive wear.

GISHOLT MACHINE COMPANY

1217 East Washington Avenue • Madison, Wisconsin

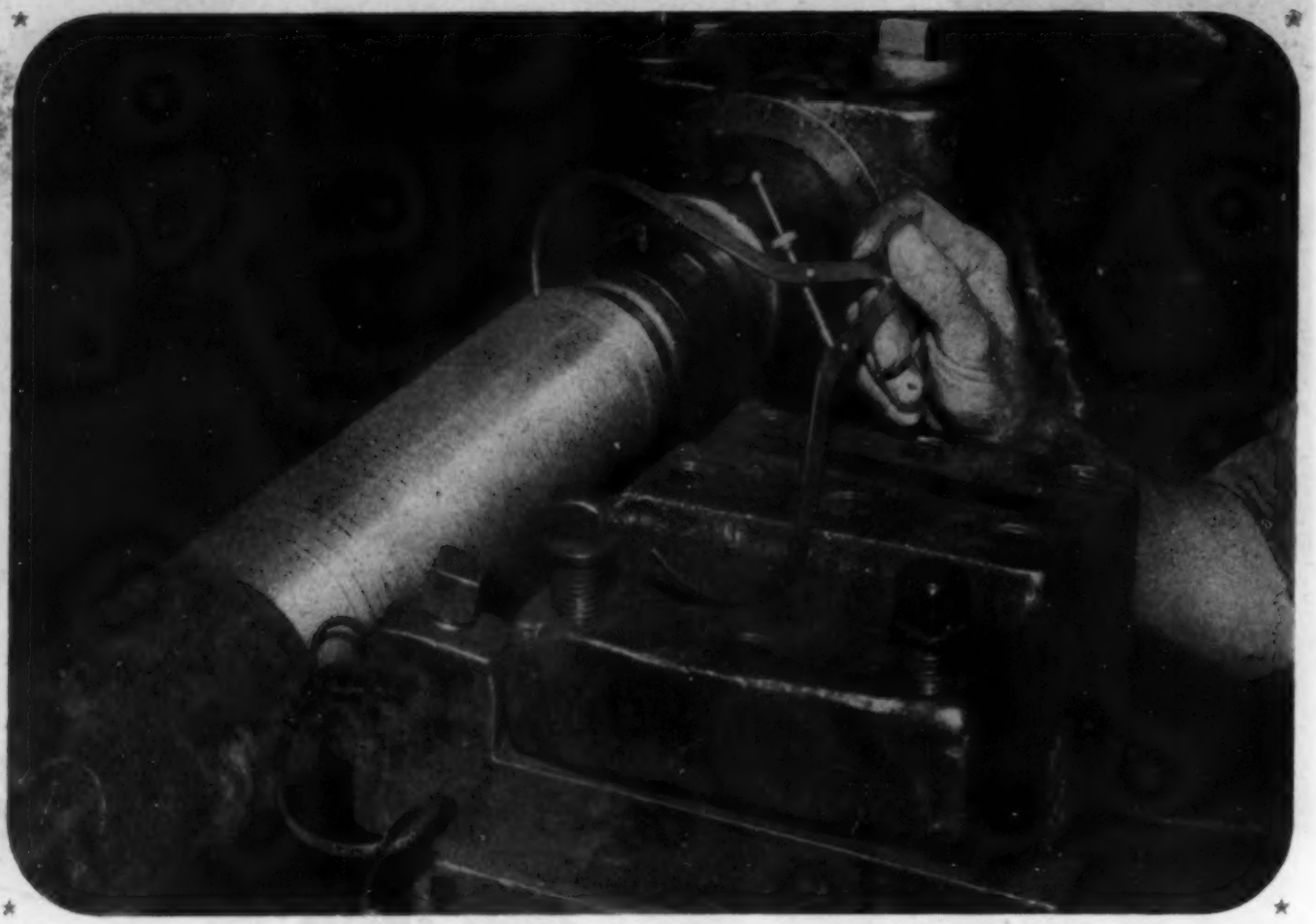
Look Ahead . . . Keep Ahead . . .
With Gisholt Improvements

DYNETRIC BALANCING MACHINES make a simple routine of assuring long life in this department. The girl operator accurately *locates* and *measures* the unbalance, and *makes the necessary corrections.* Literature on Dynetric Balancing will be sent upon request.

GISHOLT

At Gisholt, the Army-Navy "E" and the Treasury Flag fly side by side

URRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES



DBL High Speed Steel HAS SET RECORDS . . . NOW HERE'S *Super DBL!*

DEVELOPED ESPECIALLY FOR YOUR HEAVY-CUT FAST-FEED, HARD AND *Tough Jobs!*

THIS is the next step in Allegheny Ludlum metallurgical development of the DBL low-tungsten molybdenum analysis. *Super DBL* is the DBL analysis with the addition of cobalt, and it develops the maximum red hardness—the same *extra margin* of cutting quality—that you were formerly accustomed to get in a tungsten cobalt steel as compared to 18-4-1.

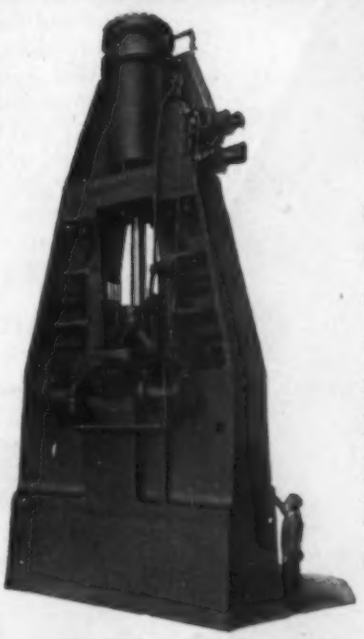
Super DBL has been thoroughly tested and proved. In performance, as well as in the conservation of vital alloys, it meets the needs of the times. You'll find it an ideal selection for heavy duty tools—especially suited for roughing or hogging work on hard, gritty materials, such as cast iron and steel; or on tough materials like heat treated alloy and stainless steels. There is nothing special in its heat treating or handling requirements. ● Available *now*—in standard forms and finishes, and in mill-treated toolholder bits—from Allegheny Ludlum and distributor's warehouse stocks, coast to coast.

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: BRACKENRIDGE, PENNSYLVANIA

A-9073 . . . W & D

FORGING COMES *FIRST*

FORGING comes first in the production of any metal part requiring strength with toughness and minimum weight. This is true in times of peace, but much more so in times of war, when metals, like humans, must stand up under unpredictable loads. ● Before the great machine tools can turn out the highly finished, microscopically accurate crankshafts, connecting rods, valves, gears, axles, airplane parts, tank parts, gun parts and the thousands of other parts vital to mechanized warfare, the hot metal must secure its great strength and toughness and its close-to-finish shape under the impact of the drop hammer. ● For over 45 years, Chambersburg Hammers, in war and in peace, have been helping industry do this job.



CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

ARMY E NAVY

CHAMBERSBURG

HAMMERS · CECOSTAMPS · PRESSES

A DEVASTATING "BLOCK BUSTER"

OR JUST A TWO-TON DUD?

SPRINGS make the difference. When one of these packaged earthquakes is released on a high level raid, the springs in the bomb-arming mechanism *must* function properly—even at temperatures of 60 below. Otherwise, the bomb's terrific potential for destruction and all the cost, risks and planning involved in placing it on the target have gone to waste.

Our spring engineers have done their vital part in seeing that "Block Busters" make more than a hole in the pavement. These bombs are made "ready for business" by springs especially designed to operate regardless of extremes of temperature, weather and atmosphere.

The same high standard of spring engineering is behind the reliable performance of the tank guns, torpedoes, aircraft cannon, anti-aircraft guns and other fighting equipment for which we have designed and supplied springs by the millions.

If you need springs to meet the tough requirements of ordnance application, our spring specialists will be glad to assist you. You'll find their intimate knowledge, not only of springs but of wartime steels now available, very helpful in solving your spring problems economically and promptly.

AMERICAN STEEL & WIRE COMPANY

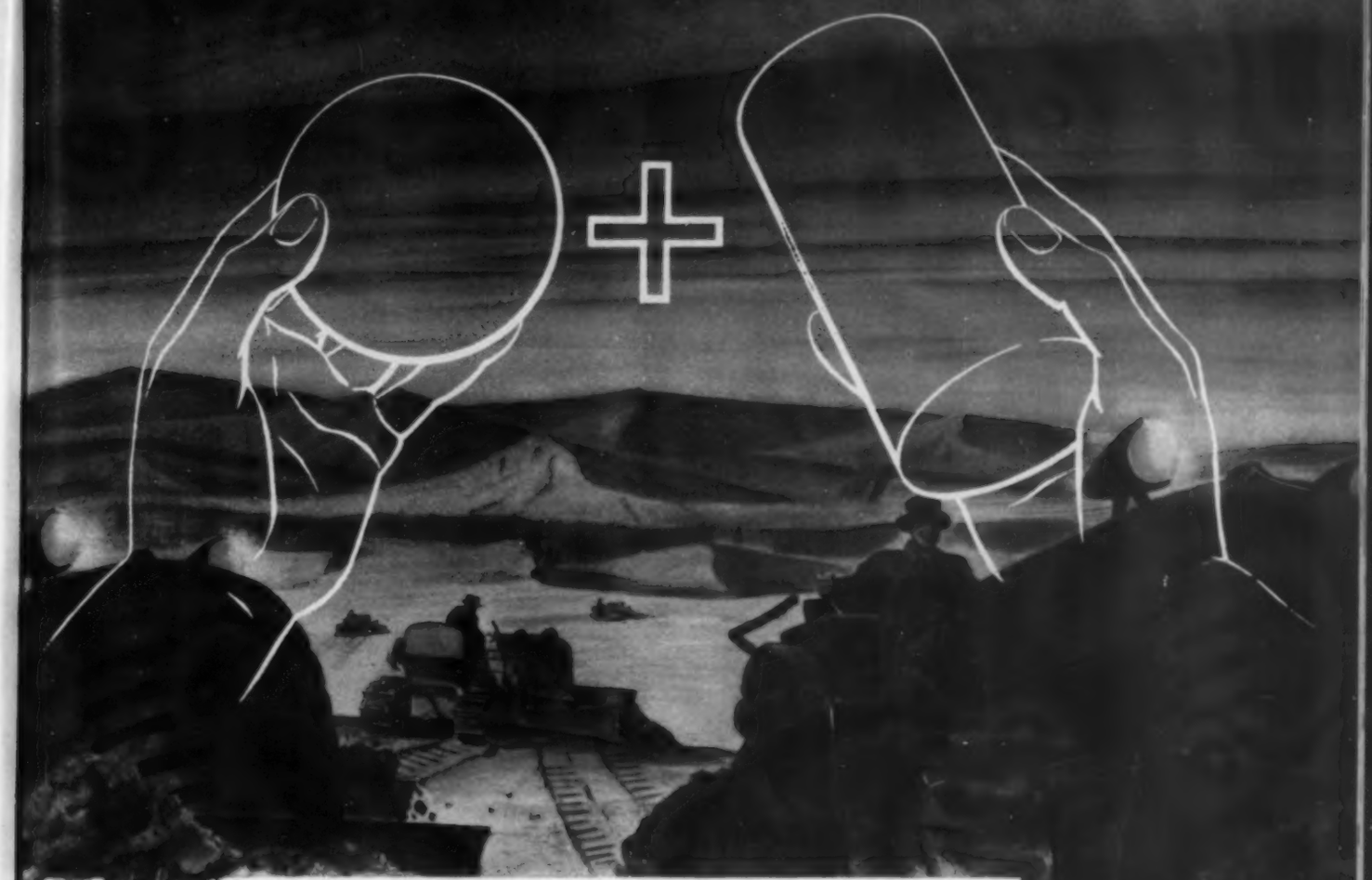
Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

U·S·S American Quality Springs

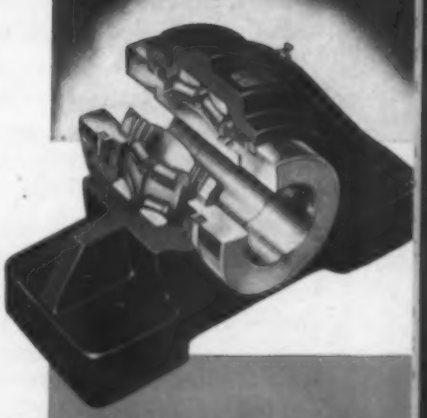
UNITED STATES STEEL

TO BUILD THE NEW WORLD



The famous Shafer basic bearing principle will be called upon to serve this heavier construction equipment

The devastation of war and the compelling demands of peace are marking out huge areas of the world for rebuilding and new construction. The industrialization of backward regions, thousands of new landing fields for the new Age of Flight, public works now deferred, countless new factories . . . these but hint at the heavy construction to come. That this vast program will require billions of dollars' worth of construction equipment, that this equipment will be built to new standards of capacity and dependability, are foregone conclusions. It is inevitable that Shafer Concavex Self-Aligning Bearings will be important features of these new heavy-duty machines. The combination of the high load capacity of a roller with the low rolling friction of a ball . . . *the basic principle* of Shafer Self-Aligning Bearings . . . has fully demonstrated its ability to stand the toughest punishment known. Its acceptance today and its role in the future are the result of Shafer's engineering leadership through nearly a quarter century of machine design progress. THE SHAFER BEARING CORPORATION, Chicago, U. S. A.



The Basic Shafer Idea—Shafer Concavex Self-Aligning Bearings . . . neither ball nor roller bearings . . . combine the advantages of both. A Shafer Bearing utilizes the effective contact *area* of a ball many times its size . . . at the same time eliminating such a ball's ineffective *mass*, and providing automatic self-alignment, high radial load capacity, automatic end-thrust absorption, superior shock resistance and long life.

SHAFER CONCAVEX SELF-ALIGNING BEARINGS

Reg. U. S. Pat. Off.

AVAILABLE IN A FULL RANGE OF SIZES: PILLOW BLOCKS • WELDED STEEL PILLOW BLOCKS FLANGE UNITS • FLANGE-CARTRIDGE UNITS • TAKE-UP UNITS • HANGER BOXES CARTRIDGE UNITS • DUPLEX UNITS • CONVEYOR ROLLS • SELF-ALIGNING ROLLER BEARINGS

A Graver-welded, rotating bedplate
17 ft. 6 in. long
10 ft. wide
1 ft. 2 in. high
Weight 19,140 lbs.

GIVING INDUSTRY a lift!

The advantages of welding for the fabrication of heavy machine parts are fully demonstrated in this rotating bedplate — one of ten recently produced by Graver for the manufacturer of a nationally known line of cranes and hoists.

Here is combined strength and precision — the ruggedness to withstand the shocks and strains of repeated heavy loads and the close tolerances that insure perfect fit and smooth operation. Here, too, is time saved in production plus an actual dollars and cents saving in the final cost.

Graver Weldments are serving many of America's leading manufacturers in the form of heavy welded machine and engine bases, frames, and other equipment. Perhaps you can benefit from this modern method of fabrication. A consultation incurs no obligation.

GRAVER TANK & MFG. CO., INC.
4811-29 Tod Ave., East Chicago, Ind.
NEW YORK CATASAUQUA, PA. CHICAGO TULSA

GRAVER
WELDMENTS

SAVE TIME...SAVE MONEY...INSURE LIFETIME SERVICE

43-17-8

Central Steel & Wire Company

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TELETYPE NUMBERS:- CHGO 1269 · · · DET 33 · · · CIN 64 · · · DAY 146

For Air Drawing . . . . . Aluminum Heat Treatment and Low Temperature Annealing

Hevi Duty PIT TYPE CONVECTION Furnace

HD-2828-A Pit Type Convection Furnace—Cover Swung Aside.

Interior of HD-2828-A Pit Type Convection Furnace Showing Centrifugal Fan in Bottom, and Heating Elements in Side Wall.

The Hevi Duty Pit Type Convection Furnace is used for operations such as air drawing, heat treatment of aluminum and low temperature annealing. This furnace is particularly suitable for handling small parts which can readily be loaded in the cylindrical baskets used in this type furnace. The use of a high velocity centrifugal type fan assures uniform heat penetration to all parts of the charge even when parts are small and densely loaded. Heating is accomplished principally by convection. The possibility of radiant heat from the heating elements affecting the work is eliminated by the use of an alloy shield between the heating elements and the work container.

HD-2828-A Pit Type Convection Furnace—Cover in Operating Position.

SEND FOR BULLETIN HD 1041

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY

MILWAUKEE, WISCONSIN

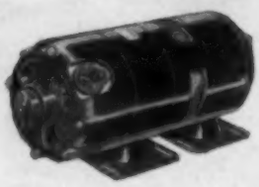
made by DISSTON

FOR AIRCRAFT PARTS . . . This standard alloy steel is made of high grade raw materials by tool steel practice. Experienced personnel, precise controls and expert supervision assure extraordinary soundness and cleanness.

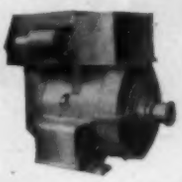
STANDARD GUN QUALITY . . . Modern tool steel practice, operating to exceptionally high standards, produces a highly satisfactory Disston Steel for automatic rifle parts, torpedo parts, gun barrels and 37 m/m shot.

ENGINEERING COOPERATION on the application of these steels will gladly be furnished by the Disston technical staff, without obligation. Write to Henry Disston & Sons, Inc., 926 Tacony, Philadelphia 35, Pa., U. S. A.

1. **TINY BUT VITAL,** this G-E gear-motor for aircraft service weighs only 8 ounces. It provides driving force for protective devices and small controls. Rating: 3 watts, intermittent, at approximately 100 rpm.



2. **DEADLINESS** of our land, sea, and air weapons has been increased—by application of the G-E amplidyne. Along the industrial front this versatile new generator-type amplifier is speeding production.



3. **EFFICIENT COOLING** of this totally enclosed d-c motor is accomplished by an air-to-air surface cooler built on the machine. High output from small frame size is the result.

THIS G-E SERVICE IS MOBILIZED TO HELP YOU

IF THE war machines you build must be equipped with electric motors or generators, G.E. may be able to help you boost your output or motorize your designs in a better way. The important point is to get in touch with us *right at the start* of your planning.

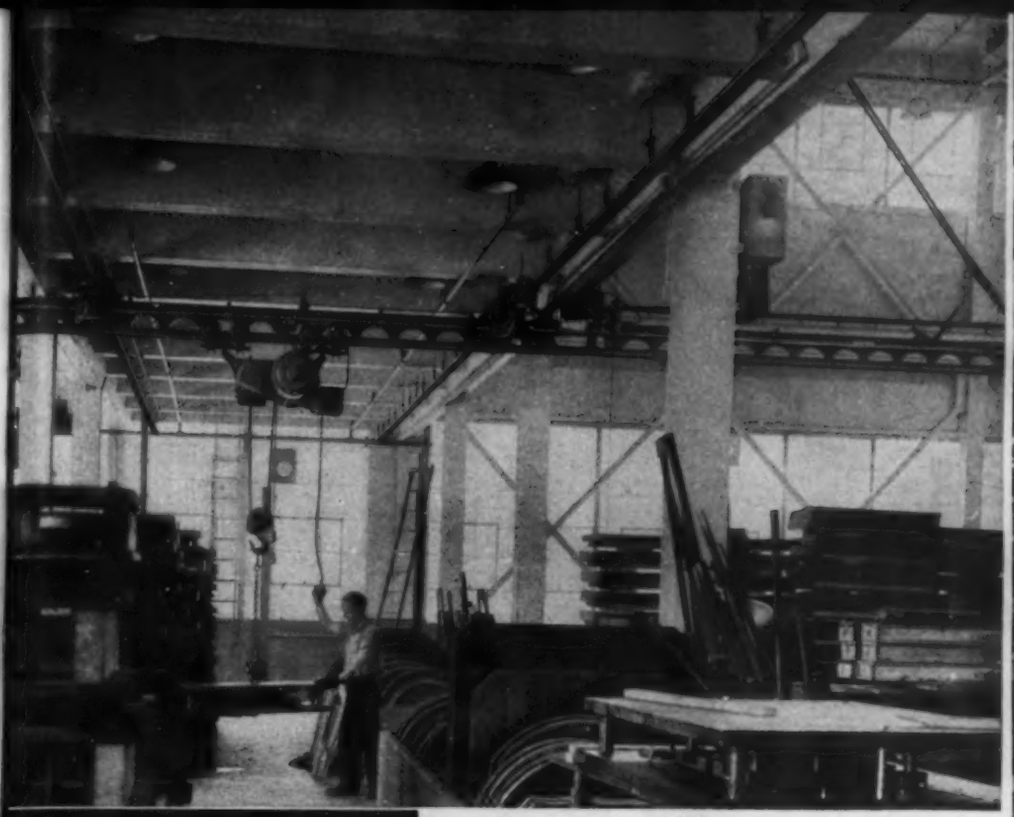
Already, by close teamwork with builders of combat equipment, we have helped to engineer and build scores of ingenious fighting motors—many too secret to show here. Thus, a great fund of G-E experience is "on tap."

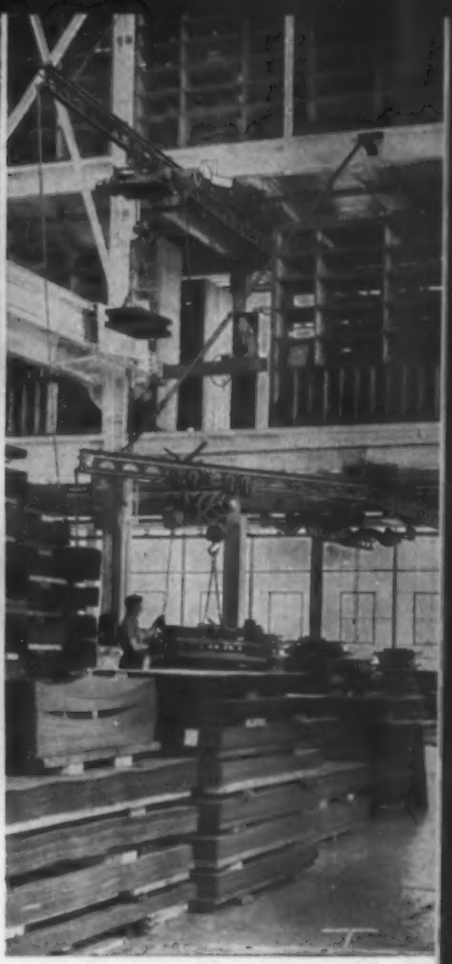
Facilities for further work on fighting motors are now available—not for every type, but possibly for the kind of motor that's right for your job. In any event, we'll give your problem prompt, realistic consideration, telling you frankly just how far and how fast we can serve you.

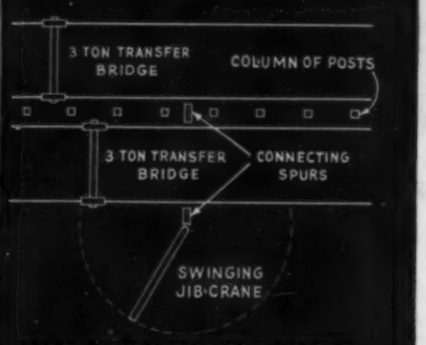
G-E engineers are helping apply all kinds of fighting motors to all kinds of war equipment. Your local G-E representative will help you take advantage of this service. *General Electric Company, Schenectady, New York.*

GENERAL ELECTRIC

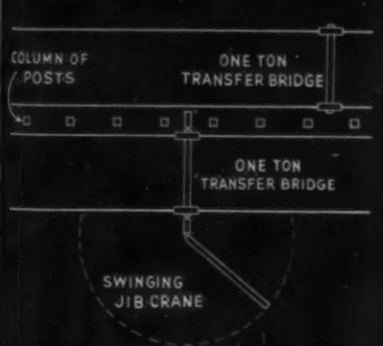
FIGHTING MOTORS







FIRST FLOOR TRAMRAIL LAYOUT



SECOND FLOOR TRAMRAIL LAYOUT

. . . UNIQUE TRAMRAIL LAYOUT

. . . Solves Handling Problem

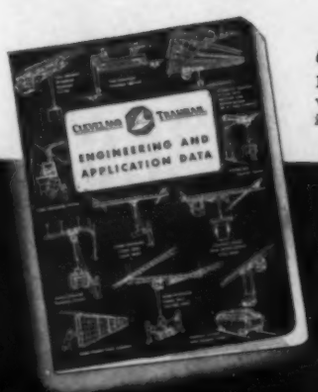
The problem of handling heavy dies in the plant of a large electric moto manufacturer was solved by a combination of standard Cleveland Tramrai transfer bridges and swinging jib cranes.

The dies are stored on the first floor at one end of the building and also on a mezzanine directly above. Two crane runways with interlocking transfer bridges and a jib crane are provided for the first floor and similar handling equipment for the mezzanine. The equipment for the first floor is of 3-tons capacity because the heaviest dies are stored there. Lighter dies are stored on the mezzanine and only one ton equipment is required there.

The Cleveland Tramrail equipment makes it an easy job to deliver dies to and from any point on the first floor o the mezzanine. Since the areas covere by the swinging jib cranes overlap loads may be easily transferred fron first floor to mezzanine or vice versa.

The bridges and carriers are han propelled since the effort required t propel them even when fully loaded i very little. The heavy lifting is done b push-button-operated electric hoists.

Cleveland Tramrail representative are in a position to help you solve tc day's problems or develop plans for th future.



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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

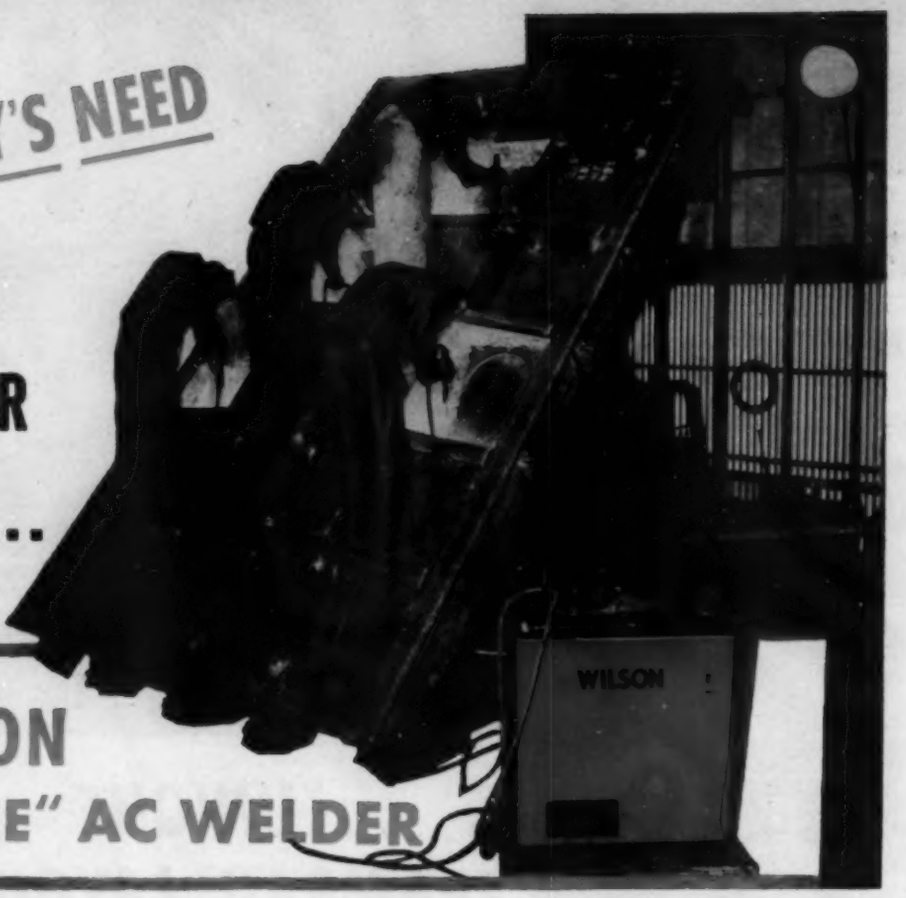
CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

MEETING TODAY'S NEED

FOR MORE AND FASTER WELDING...



...THE WILSON "BUMBLE BEE" AC WELDER

To keep on top of your heavy 1943 schedules change to AC welding with the new Wilson "Bumble Bee" welder.

This sturdy, efficient Wilson AC machine gives you three advantages that have unusual value today:

1. It increases welding speeds 15% to 25% – particularly on horizontal fillet welding – through use of heavier currents and larger AC electrodes.
2. It cuts power consumption—and costs—as much as 40%, because AC welders eliminate idling loss.
3. It simplifies maintenance because the "Bumble Bee" has no heavy rotating parts that need frequent attention.

Equally important – the "Bumble Bee" can be delivered faster than equivalent dc machines because it requires much less critical materials. Two sizes are available – 300 and 500 amperes. For full details write to Wilson Welder & Metals Co., Inc., 60 East 42nd Street, New York 17, N. Y.

FOR SUPERIOR AC WELDING USE WILSON 530 ELECTRODE

A perfect teammate for the Wilson "Bumble Bee" is the all-position AC electrode – Wilson No. 530. This electrode produces high quality welds to meet the following specifications:

AWS Filler Metal Specification E6011.

Navy Bureau of Ships, Specification 46E3, Grade III, Class I.

A.S.M.E. Boiler Code, Paragraph U68.

WILSON

WILSON WELDER and METALS CO., INC.

General Offices: 60 East 42nd Street, New York, N. Y.

WILSON AC WELDERS — distributed exclusively through Air Reduction Sales Co.

HYDRO-ARC FURNACES

have "caught on" quickly

Two outstanding features of the Hydro-Arc Furnaces are:

(1) ACCURATE HYDRAULIC ELECTRODE POSITIONING
(2) POWER OPERATED ELECTRODE CLAMPS

It's amazing . . . how fast the HYDRO-ARC electric arc melting furnace has "caught on" in the industry. It has several features that are big improvements over other electric furnaces.

Here they are . . . check them for yourself. 1. Especially low operating cost. 2. Low carbon pick-up. 3. Low electrode and power usage. 4. No climbing on the furnace among the flames to strain on burnt bolts and no swinging the sledge hammer to clamp electrodes. 5. Electrodes slipped from floor. 6. No steel cable stretch, none to break. 7. Fast electrodes. 8. Simple control . . . can change any part in a few minutes. 9. Blows dust off electrodes as they are slipped. 10. No troublesome limit switches on the electrode arms. 11. Larger roof ring diameter . . . saves burning out flanges.

Write for more information about what has been called "The most important development in electric furnaces in the past twenty years".

HYDRO-ARC
FURNACE CORPORATION

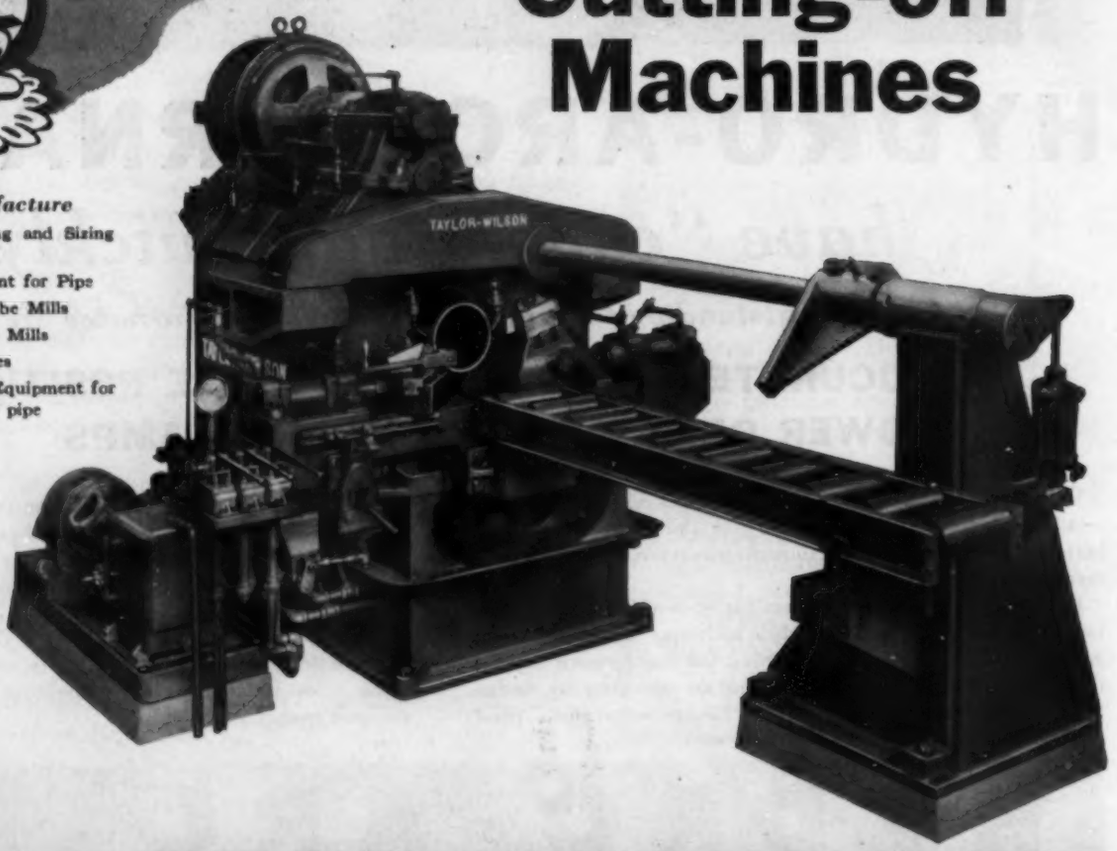
561 HILLGROVE AVENUE, LA GRANGE, ILLINOIS (A Suburb of Chicago, Illinois, U. S. A.)
TELEPHONES: LA GRANGE 4545 and 4546 CHICAGO LINE: ENTERPRISE 1068

Associated with Whiting Corporation

GLOOMY GREMLINS Grumble and Gripe

Taylor-Wilson Cutting-off Machine finds many uses in war production. Among these and for which the machine is especially adapted are the cutting-off of Roller Bearing Blanks, Bomb Blanks, Coupling stock, etc. The machine is made in six sizes, each with a wild range. It is easy to operate, smooth running at all speeds, accurate to the last degree and may be depended upon to stand up under hard continuous service. Cutting-off tools are hydraulically driven. The whole job is engineered and built with such fine precision that Gremlin habitues of war production plants find no vulnerable point of attack.

TAYLOR-WILSON Cutting-off Machines



We also Manufacture

Straightening, Burnishing and Sizing Machines

Galvanizing Equipment for Pipe

Small Seamless Tube Mills

Butt Weld Pipe Mills

Test Benches

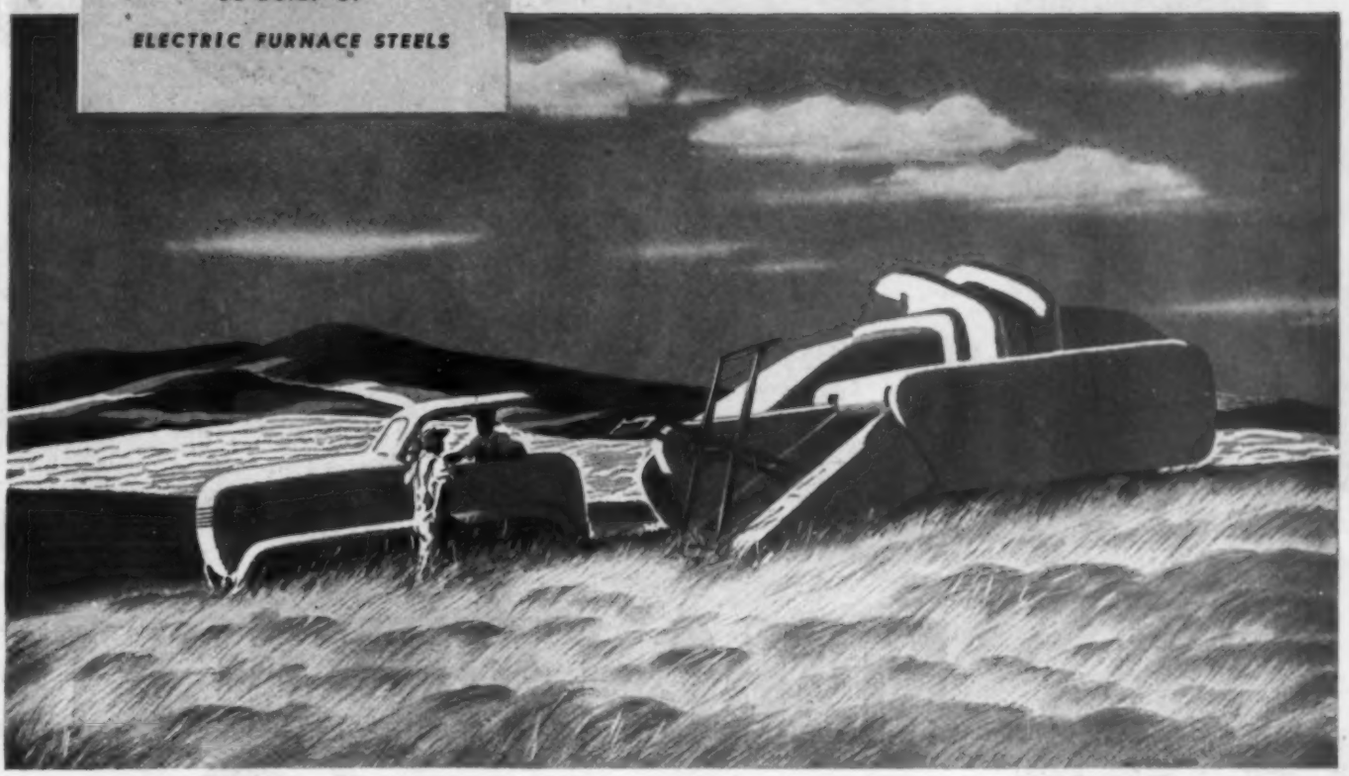
And Complete line of Equipment for the finishing of pipe

TAYLOR-WILSON MFG CO.

15 Thomson Ave., McKees Rocks, Pa.

PITTSBURGH DISTRICT

THE LIGHTER, STRONGER, BETTER THINGS OF TOMORROW WILL BE BUILT OF ELECTRIC FURNACE STEELS



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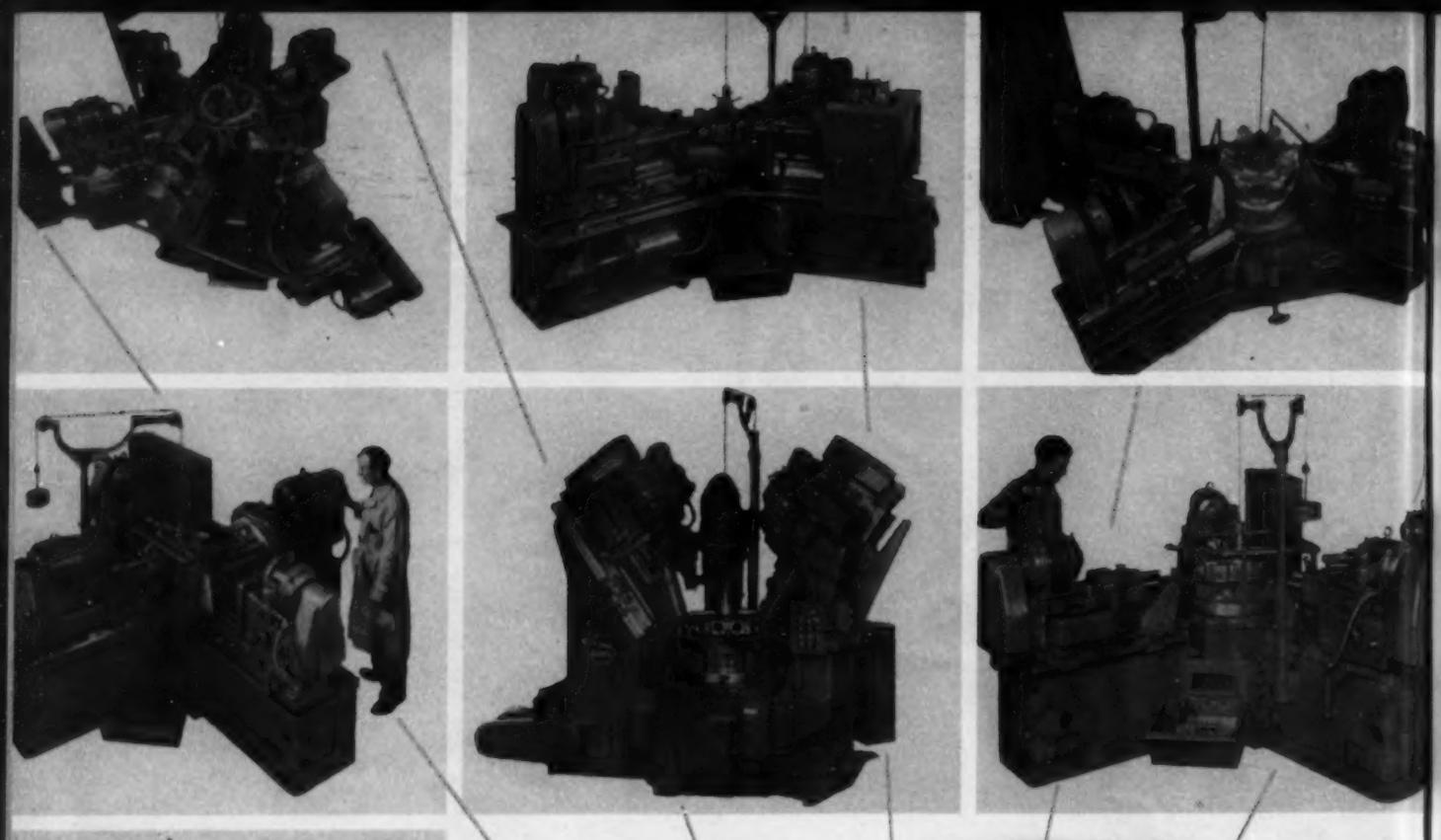

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THE R. C. **MAHON** COMPANY

DETROIT CHICAGO

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Women prove adaptable for variety of work as manpower shortage becomes acute. *Page 66*

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STEEL

The Magazine of Metalworking and Metalproducing

SEPTEMBER 27, 1943

Volume 113 *Number 13*

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to KEEP 'EM ROLLING!

Railroad men perform near-miracles every day. With less locomotive capacity and fewer freight cars than a decade ago, last year they moved about two-thirds more ton-miles of freight and over 100% more passenger-miles than in 1940. Figures for this year show substantial increases.

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* *Nickel* *

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*

STEEL
September 27, 1943

Integrity in Government

Anyone who keeps his ear to the ground cannot escape the conclusion that there is a growing apprehension of the power of the federal government to impair justice.

The evidence is of diverse character. In one town one sees it in the complaints that OPA rulings, reinforced by the activities of fresh-out-of-college lawyers in Washington, act to deprive landlords of their constitutional rights. In the next town the evidence may come from a manufacturer who, his war contracts canceled a long time ago, has waited patiently month after month for a year and a half for a settlement, which has not yet been made because a new government negotiator appears on the scene every few weeks and the newest federal incumbent always says, "You've got to give me time; this case is all new to me."

In the next town, the evidence may come from a man who is embittered because he thinks the Treasury Department has gypped him on his taxes. This is a frequent charge and there is reason to believe that some officials in this department try to get all the tax money the traffic will bear.

Then there is the evidence from manufacturers whose war contracts are being renegotiated. In this field of complaint, one hears charges ranging all the way from mild coercion to open threats of reprisals. In the hearings before the House Ways and Means Committee the statement was made that to fight the government on renegotiation was to invite reprisals. This charge has not been refuted convincingly.

We do not contend that every complaint against government agencies is justified. We do believe that the number of complaints and particularly the feeling among so many complainants that they have no recourse to ordinary constitutional guarantees indicate a situation so serious that the federal administration ought to do something about it.

In a democracy, respect for government rests heavily upon the idea that the government will be just to the governed. Even in wartime, when extraordinary powers are granted to the executive branch, the Chief Executive is expected to use these powers sparingly.

An administration in its third term, with a bureaucratic army of more than 3,000,000 civilians, runs the constant danger of becoming intoxicated with power. We believe it is time for somebody high up in administrative councils to call a halt, to curb abuses of power and to reinstate integrity in government.

FAMILY PURSE BULGES: Checks by the United States Chamber of Commerce indicate that American families are revising upward their plans for postwar purchases. The chamber made a survey last December and has just completed a similar one. Comparison of the results of the two shows that intention to buy has increased considerably during the eight-month interval.

In the latest survey, 61 per cent of the families say they are saving money; last December 56 per cent indicated they were able to save. Last December 2,590,000 families reported they were planning to buy automobiles at a cost of $2,331,000,000; now 3,675,000 families intend to spend $3,307,500,000 for postwar automobiles. Similarly, whereas the December survey showed families were intending to buy household appliances costing $860,185,000, the most recent check-up places this figure at $1,215,910,000.

However, the peak of affluence may be near or it may have passed. In December 73 per cent of the people felt they were as well off as a year ago.

(OVER)

In the latest survey, 72 per cent feel this way. Families in the East and Far West reported their financial status still was improving, but in the Middlewest and South the reports indicated a halt or minor decline in affluence.

These figures should be interesting to every manufacturer whose product is affected by the buying habits of the public. —p. 67

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KAISER'S STEEL VENTURE: Through the medium of newspaper and radio publicity, the American people have been conditioned to accept as extraordinary any achievement that can be attributed to Henry J. Kaiser. To millions of headline readers and radio listeners he has become the miracle man of this emergency.

To cold-blooded industrialists he is something else. They refuse to take him at face value. They want to know what he has on the ball. They do not believe in miracles.

Consider Kaiser's Fontana steel enterprise. This would attract the attention of the metalworking industry regardless of whether Mr. Kaiser were identified with it or not. To steelmakers, the Kaiser glamor does not add or subtract from the significance of this venture. It happens to be the first integrated iron and steel project on the Pacific Coast.

John Knox, STEEL's steel plant editor, has visited Fontana and witnessed the Kaiser installations. Blast furnace, coke works, steelworks and rolling mills are the work of eminent engineers and equipment manufacturers who have participated in much of the expansion of iron and steel facilities throughout the nation in recent decades. The Fontana layout is good, according to accepted standards.

What part it will play in the postwar struggle for markets remains to be seen. Its destiny is important to the industry. Because of this fact, we have gone to some pains to describe the Kaiser Fontana properties and to explain the Kaiser plans for its peacetime operations. —p.72

• • •

A JOB FOR CONTROLLERS: Enders M. Voorhees, chairman of the finance committee of U. S. Steel, hit upon a timely theme when he urged members of the Controllers' Institute of America to improve the quality of corporation financial reports.

We are particularly pleased to endorse his remarks because STEEL for some years has been emphasizing the need of financial statements which help the public to understand industry's problems. "So cramped has our style become," said Mr. Voorhees, "that we are leaving the social field to the bureaucrats and reformers who, because they do not have to make ends meet, are limited only by the capacity of their imaginations."

Controllers, as the bookkeepers of industry, have the opportunity, believes Mr. Voorhees, to furnish the public with facts upon which it can form opinions. If all in the profession were to do this objectively, it would go a long way toward dispelling the bunkum of the "production for use" theorists on government payrolls. —p. 70

• • •

CLEARER AIR OUTSIDE: A move which makes sense from every standpoint is found in the decision of WPB to decentralize its operations so that more of its activities will be closer to the areas of war production.

WPB's Operations Council figures that the contemplated action will reduce the necessary travel by businessmen to and from Washington by 33 per cent, will slash paperwork by as much as 40 per cent and will expedite negotiation appreciably.

These advantages are tangible and worthwhile, but there is another which may prove to be equally important. In Washington the government agency man and his business conferee are under the spell of bureaucratic officialdom, to say nothing of the baleful influence of inner sanctum gremlins. Decisions reached in the clear air of any locality removed from Washington should be advantageous to both parties. —p. 49

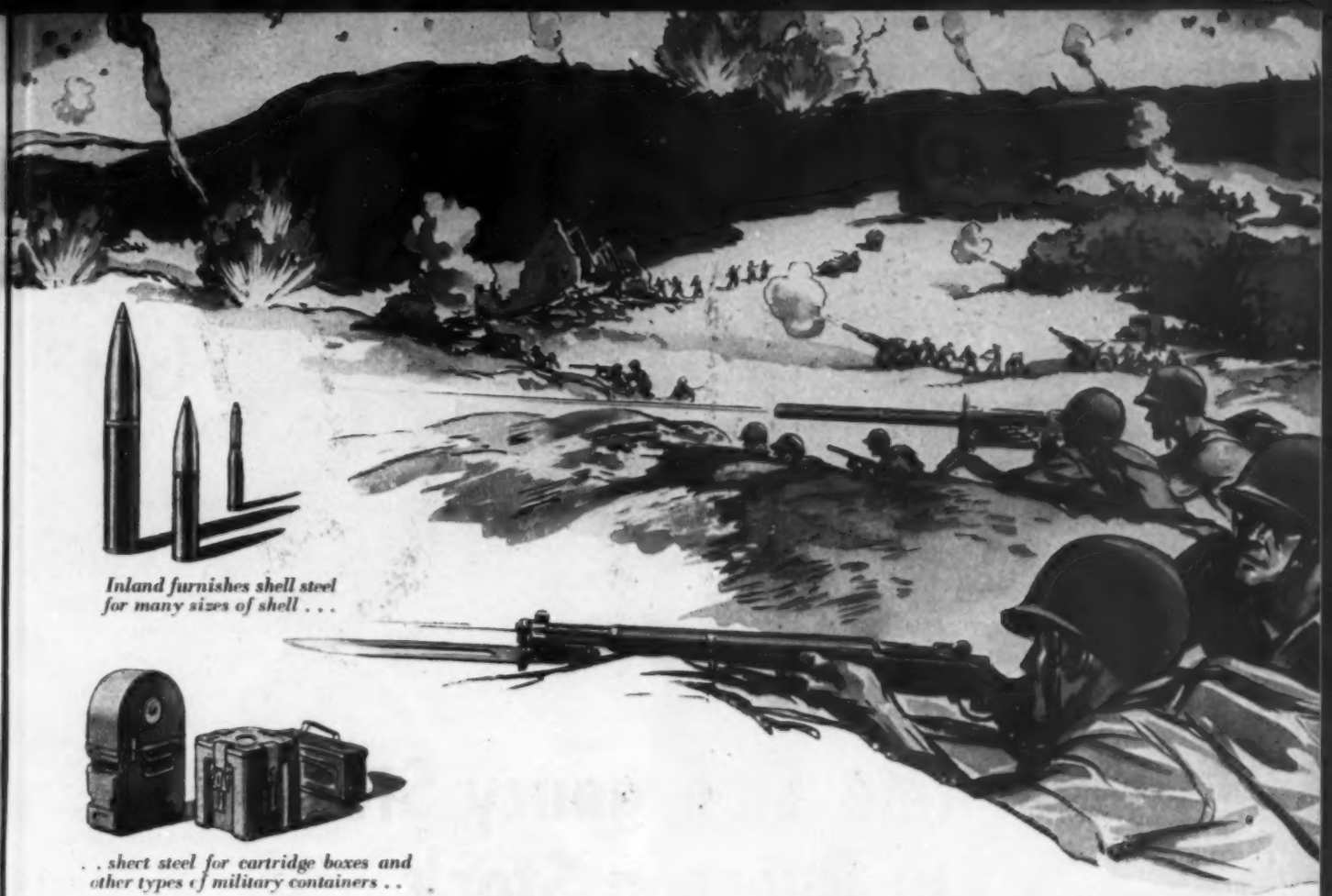
• • •

WAR OUTPUT STILL UP: Donald Nelson's munitions index (November, 1941 = 100) rose 25 points in August to a new high of 618. This is a gain of 5 per cent over the July figure and is gratifying from several angles.

First, it probably indicates a correction—in part, at least, of the difficulties which were publicized with so much emphasis a few months ago. Secondly, it means that munitions output, already at a high point and menaced by cutbacks, cancellations, etc. still is mounting. Thirdly, it indicates that if there was a summer letdown, it was inconsequential and is in the background. —p. 44

E. L. Shaner

EDITOR-IN-CHIEF



Inland furnishes shell steel for many sizes of shell . . .

. . sheet steel for cartridge boxes and other types of military containers . .

. . bars for machine gun tripod assemblies . . .

. . special steel for large and small caliber gun barrels . .

and high-strength Hi-Steel that withstands the terrific stresses in gun carriages.

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RYERSON STEEL-SERVICE

Most Industrial Stocks Adequate

Shortages reported at Chicago and Youngstown . . Home deliveries delayed by scarcity of handlers, drivers, trucks and tires. . . Loss of manpower limits output of mines

HAROLD L. ICKES

"Situation will grow worse before it grows better"

INDUSTRIAL users of coal in most war production centers have adequate stocks and are not unduly concerned with the possibility of a shortage, a survey by STEEL's editors reveals.

Exceptions to the generally satisfactory situation are noted in Chicago and the Ohio Valley. Youngstown district mills are working on virtually a hand-to-mouth basis, with one company having stocks sufficient for only three or four days. Coking coals are low at Chicago.

In other districts consumers have been building up stocks steadily since the mine strike ended and in some cases have larger inventories than a year ago. They anticipate no difficulty unless a new coal mine strike is called.

Outlook for domestic consumers is much gloomier. Deliveries to householders in most areas are extended from four to six weeks. This is caused not so much by a shortage of coal as a lack of handlers and trucks. Many retailers have been forced out of business by inability to obtain drivers and yard workers.

The situation is most acute in cities swollen by in-migration of war workers, placing a heavier burden on the facilities of retailers. Conversion from oil to coal heating plants also has increased the demand for home coal.

Government fuel administrators and coal producers are in conflict on the outlook for the winter. Secretary Harold L. Ickes, solid fuels administrator for war, says: "Coal production has been unable to keep pace with the expansion of war requirements, despite such expediencies as lengthening the mine workweek and the stocking program . . .

"There is a far better chance that the situation will grow worse before it grows better, because the coal industry faces strict limitations despite any efforts which can be made to raise production levels.

"It faces a continual loss of manpower because of the war. The biggest trouble is lack of replacements."

J. D. Battle, executive secretary of the National Coal Association, deplored the predictions by government officials of a shortage. The nation will have suffiicent coal for war industry and for home heating, he insisted.

"If certain people in high places in Washington will stop making statements concerning the possibility of coal shortages and threats of rationing that induce panic buying, it will be better for all concerned and the fuel requirements of the nation will be met," he observed.

A considerable tonnage of United States coal is expected to be shipped to Italy which, while an Axis member, was supposed to have been receiving a million tons a month from Germany. England, which normally could supply a substantial amount of the fuel needed in Italy, is facing a grave shortage herself as the result of strikes. Diversion of American fuel to the peninsular nation or any other occupied territory would soon be reflected in the amount available for domestic heating.

Analyses of the supply situation by districts:

DETROIT: Large industrial users of coal in this area—Great Lakes Steel, Detroit Edison and Ford Motor—are at the moment comfortably fixed on supplies and are not anticipating any great difficulty in keeping stocked over the winter months. Great Lakes, for example, is gradually building up stocks to the required 90 days' supply when the navigation season closes, and has been assured by its coal source that the necessary tonnage will be moved in, all by water. Scattered reports from smaller industrial users reflect some concern over coal supplies, but with directives from Washington guiding shipments of coal and war plants holding top priority, the situation is well in hand.

Quite the reverse of the above condition is true in the domestic market which has been swollen by in-migration of 300,000-400,000 persons to work in war plants, conversion from oil to coal in many heating plants, and a shrinkage of 33 1/3 per cent in the number of coal dealers still in business.

At present only 30 per cent of winter supplies are in consumer bins, and yard stocks are approximately 50 per cent below the level of this time last year. Shortage of handlers and truck drivers is little short of appalling, some yards even being forced to discontinue deliveries altogether because of no drivers.

CLEVELAND: Steel producers in this area have a reasonably comfortable supply of coal stocks. Most producers report their stocks are around a 30-day supply with incoming shipments keeping them at that level, although one mill reports only a 20-day supply. High and low volatile metallurgical fuel is being shipped into the district in adequate quantities but producers are unable to build up their stockpiles to the 60 days' supply ordered by the fuels administrator.

Producers of finished steel products are maintaining their 60-day stockpiles and have not encountered any difficulties

on shipments of the vital war fuel.

About 5,500,000 tons of coal have been allocated for shipment to upper lake regions from Sept. 15 to the end of the shipping season. Domestic consumers will feel the pinch because of this for the supply being shipped in for domestic use is only one-third of that needed.

Steel producers here report that unless a strike is called this fall they believe they will be able to build up their coal stocks to 60 days' supply once the needs of the upper lake regions have been met.

PHILADELPHIA: Most industrial consumers are in a better position than usual at this time of year. Strikes in the mines last spring and the possibility of new disturbances this fall, plus the prospect of a substantial movement to Italy, have resulted in protective covering. Where stocks have been built up substantially, added purchases are limited by the government.

PITTSBURGH: A distinct shortage exists in the domestic market, but industrial consumers are fairly well supplied. Most companies report stocks not as large as they wish but see no threat to continued operations.

Possibility of a new strike is worrying users.

BUFFALO: Consumers and suppliers of industrial coal believe rumors of a serious coal shortage are unfounded. District plants are fairly well stocked and efforts to build up dock stocks are meeting with average success.

One supplier blames agitation to get in supplies for the current unrest in the market. He contends there is no shortage of industrial fuel and says shipments are running ahead of a year ago.

NEW YORK: Despite interruptions to production in recent months, industrial consumers in many cases have more coal on hand than is usual at this season. Difficulties they encountered last spring because of coal strikes and the threat of possible further later disturbances in the bituminous field this fall has made consumers more alert to the importance of getting in coal for their winter requirements earlier than normally, with a result that during the summer they stepped up their buying.

Industrial consumers average three months supply, it is estimated. Some are handicapped by having limited storage facilities, with a result that they have not more than a month's stock on hand. A few consumers have about six months' supply.

Their purchases will be limited by Washington where stocks in the case of industrial companies amount to more than 30 days' supply; railroads, 45 days' supply; and public utilities, 60 days' supply. It is said that they will be permitted to buy only 75 per cent of their current monthly consumption, where stocks run beyond those amounts.

YOUNGSTOWN: Steel plants here are virtually working on a hand-to-mouth basis, and the lack of fuel is causing considerable concern.

Stocks were depleted during last spring's strikes and coal production since has not permitted steel plants to rebuild their reserves. In fact, they even had to use reserves to maintain operations.

One large steel plant has only enough fuel to last three or four days. The same situation is faced by the independent blast furnaces which are being fed chiefly by beehive coke. Two other steel mills have reported somewhat better supplies for their by-products coke plants, one about a week's supply and the other about a week to 10 days' supply. They normally carry three weeks' to a month's reserve.

The domestic fuel situation here is serious. Virtually no deliveries are being made on domestic coal, and those orders that are being filled are at least a month old.

CHICAGO: Coal supply situation in this district has deteriorated steadily since mines reopened last spring.

Chief worry insofar as the steel industry is concerned is in coking coal which must be shipped in from Eastern fields. High volatile grade is shortest in supply, and low volatile is not far behind—the two are mixed in an approximate 50-50 proportion for charging into by-product ovens at the local plants.

Steelmakers are reluctant to divulge their raw materials inventory situation, but it is known that stocks of coking coal range from a period of three or four days to a few weeks.

Insofar as steam coal is concerned, the situation is considerably easier, but nevertheless stocks are well below those which should be carried at this season.

Several companies in this district operate their own coal mines, and thus have some control over the supplies of fuel available to maintain their own operations. However, none produce their total requirements.

Assurances have been given by the government and commercial interests that steel industry requirements will be met in full, but the ice is thin when inventories on the ground total only a few days.

Some steel producers have been handicapped in their supply problem by having to receive coal currently by rail, instead of vessel for which their unloading facilities are designed.

Illinois solid fuel shippers announced Sept. 17 through the state's Bituminous Coal Producers Advisory Board, that the first, and to date the only, coal allocation plan in the country had been worked out to meet the Solid Fuel Administration's demand for emergency wartime tonnage.

The system, set up on a voluntary basis by producers, will be operated on a percentage basis. Large and small shippers alike will contribute to the extra tonnage to be shipped from the state, usually at remote points. At present, the solid fuel administrator has made requisition for approximately 200,000 tons of Illinois coal.

CINCINNATI: This area is in a preferred position as regards coal supply due to proximity to the mines and to river transportation. No shortage is expected unless stocks are restricted by the government or coal is diverted to other districts.

COAL RESEARCH

A new five-year coal research program to more effectively utilize the country's coal reserves is being undertaken by Bituminous Coal Research Inc. at Battelle Memorial Institute, Columbus, O. Contemplating an expenditure of $2,500,000, the program seeks to develop smokeless stoves, fully automatic home heating and cooling, gas from coal for the nation's pipelines, radically improved railroad locomotives and chemical products.

Arms Output Over Summer Slump

Gains 5 per cent during August. . . Aircraft production totals 7612, with emphasis on heavier and better models. . . Ground signal equipment up 30 per cent

MUNITIONS production in August climbed 5 per cent above July, apparently ending the sharp summer slump. The August report, approved by Donald M. Nelson, War Production Board chairman, before he left on a London mission, was held up for several days because War Department officials feared it was "too optimistic".

The production index rose 25 points to 618 (November, 1941 = 100).

Production of airplanes, measured on a weight basis, increased 7 per cent. The increase during the past half year has been more rapid than during 1942. August output reached the record total of 59,000,000 pounds of airframe weight, and during the past five months the average monthly increase has been 3,300,000 pounds, more than twice the average monthly increase during 1942.

Despite this progress, the aircraft program still is behind schedule. Employment shortages continue to hamper production.

During August, 7612 planes were produced. Heavy bombers ran 11 per cent above July, and fighters as a group, ran

5 per cent higher than it was in July.

"Not only was August's airplane gain the best since May, but production would have climbed even higher had it not been for design changes," WPB said. "Our plane production now has reached a point where we can afford to take slight temporary losses in production to get a more effective model. Since the combat efficiency of a plane can be determined only through actual fighting experience, design changes always will be necessary."

Ground signal equipment output gained 30 per cent in August, and practically is up to schedule.

Ammunition gained 1 per cent although no increase was scheduled. By next spring this category is expected to become one of the most outstanding ordnance programs, emphasizing the shift from capital to expendable items.

Work done on naval vessels increased 4 per cent and on merchant vessels 1 per cent. Deliveries of naval vessels reached a new peak of 284,000 displacement tons, a gain over July of 40 per cent. Delivery of destroyer escorts was 20 per cent ahead of schedule.

In the less bothersome programs, combat vehicles declined 6 per cent, self-propelled artillery gained 32 per cent, antiaircraft guns and equipment rose 4 per cent, small arms increased 5 per cent and motor vehicles gained 10 per cent.

Construction again declined according to plan.

Present, Past and Pending

■ STEEL RECOVERY CORP. TO BE DISSOLVED

PITTSBURGH—Steel Recovery Corp., the government's steel salvage agency, has completed its work and will be dissolved in "the very near future", it was reported last week.

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■ STUDIES POSTWAR PLANT DISPOSAL

WASHINGTON—Dr. A. D. H. Kaplan has been retained by the Committee for Economic Development to make a special study of what to do with government-owned plants and surpluses after the war. On leave as economics professor from the University of Denver, Dr. Kaplan is expected to complete a preliminary report by November.

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■ MACHINE TOOL WORKERS FURLOUGHED

CLEVELAND—Decline in demand for machine tools and necessity for changing over for the manufacture of other war material is causing Warner & Swasey Co. to furlough some workers for 90-day periods.

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■ INDUSTRIAL OUTPUT HOLDS AT JULY LEVEL

NEW YORK—August industrial output as measured by the Federal Reserve Board held at the July level of 205 per cent of the 1935-39 average.

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■ EXPERIMENTAL STEEL HIGHWAY SECTION INSTALLED

DARIEN, CONN.—An experimental steel highway section has been installed at "proving grounds" here by the Irving Subway Grating Co., Long Island City, N. Y. Sponsors believe the steel-type roadway holds important postwar potentialities.

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■ CERTIFICATES WAIVED ON STEEL SALES TO FARMERS

WASHINGTON—Steel distributors may replace in their stocks merchant trade products sold to farmers without getting certificates from the latter. This is provided in direction 2 to War Production Board's order M-21-b-2.

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■ PRICES SET FOR TENNESSEE-ARKANSAS CHARCOAL

WASHINGTON—Specific prices were announced last week by Office of Price Administration for additional grades of Tennessee and Arkansas charcoal. The new prices are: In bags, $35; granulated in bags, $34.50; midget briquettes in bulk, $38 and in bags, $47; standard, in bags, $40; soft water proof, $40, and charcoal screenings, $19.40, including bags.

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■ MACHINE TOOL SHIPMENTS, ORDERS DECLINE

WASHINGTON—Machine tool shipments dropped about 10 per cent in value during August to $87,827,000, War Production Board announced. Total orders were $40,192,000, about 3 per cent under July bookings, but cancellations were only $6,814,000 compared with $12,734,000 in July. Order backlog at the end of August totaled $386,792,000, a decline of about 12.3 per cent from the July figure.

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■ RAILROADS PLACE 408 NEW LOCOMOTIVES IN SERVICE

WASHINGTON—Class 1 railroads placed 408 new locomotives in service during the first eight months of 1943, compared with 514 during the comparable 1942 period.

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■ ALUMINUM FORGINGS TO REACH 45 TIMES PEACE PEAK

PITTSBURGH—Aluminum forging capacity 45 times its peacetime peak will be attained by the Aluminum Co. of America by the end of this year, according to President Roy Hunt.

MUNITIONS INDEX

(November 1941 = 100)

Month	1940	1941	1942	1943
Jan.	..	41	166	460
Feb.	..	45	182	486
Mar.	..	52	213	530
Apr.	..	60	247	563
May	..	57	276	564
June	..	59	309	573
July	23	64	339	593
Aug.	22	72	372	618
Sept.	22	83	387	...
Oct.	27	91	403	...
Nov.	34	100	448	...
Dec.	50	133	497	...

Production Efficiency of Small Arms Releases Plants

Increased efficiency in the manufacture of small arms ammunition has reached the point where the Ordnance Department, Army Service Forces, has been able to relinquish two ordnance plants to fill another vital war need, the War Department announced last week.

The United States Rubber Co. will replace small arms ammunition production with the manufacture of synthetic rubber tires at the Eau Claire Ordnance plant, Eau Claire, Wis. The Kelly Springfield Co. also gradually is converting the Alleghany Ordnance plant at Cumberland, Md. from the manufacture of small arms to rubber tire production.

Net Worth of United Steel Workers Union Increased

Audit report of the United Steel Workers of America for the period, Dec. 1, 1942 to May 31, 1943, shows increase in net worth of the union over the six months period of $871,328.12. Net worth is now listed as $2,646,238.81, the increase representing the excess of income over expenses from Dec. 1, 1942 to May 31, 1943. Audit, by Main & Co., covers both the international office in Pittsburgh and 40 district offices.

Total receipts during the six-month period show initiation fees at $3 per man, $362,820.50. Dues received at $1 per month per man totaled $3,629,879.46.

Labor Supply Will Determine Placing of New War Contracts

War Production Board chairman forbids materiel orders to West Coast and similar areas if military timetables can be met by allocating them elsewhere. Premiums for small plants approved

PLACEMENT of war contracts in the country's 59 areas of acute labor shortage was forbidden by Donald M. Nelson, War Production Board chairman, if it is possible to meet military timetables by placing them elsewhere.

Mr. Nelson also directed that "no contract requiring increase of employment shall be placed in the West Coast region or any other region to which a program similar to the West Coast manpower program may hereafter be applied" without prior approval by Mr. Nelson or another official designated by him.

The new war contract placement policy rates manpower second only to timeliness of delivery.

"As insufficient manpower is hurting production, procurement agencies are directed not to place contracts in areas of acute labor shortage notwithstanding the existence of facilities capable of doing the job, whenever it is practical to place the contract elsewhere," said Tudor Bowen, director of WPB's procurement policy division.

Payment of a premium to small plants situated in noncritical labor areas was authorized by the war production agency. Earlier policy emphasized existence of facilities more than available labor supply in the placing of contracts.

WLB Tells Bethlehem To Organize Vacation Plan

Bethlehem Steel Co., Bethlehem, Pa., has been directed by the shipbuilding commission of the War Labor Board to organize a liberalized vacation plan for employes of eight of its shipyards.

Employes with five years' service as of next May 1 at the Staten Island yard, the two in Brooklyn and in East Boston, and three in Baltimore, will receive two weeks vacation with pay while those with more than one year's service will receive one week of vacation with pay.

Board Stresses Acuteness Of Labor Shortage

Problem of manpower has grown so great that if production schedules are to be met during the next 12 months, 1300 workers must be found for essential war industries for every 1000 entering military service, according to the Division of Industrial Economics, National Industrial Conference Board.

Total number of persons at work or in service in July continued at the record level of 63,600,000. Little relief was afforded by normal seasonal reductions of 320,000 in agricultural employment during the month, and by further reductions of 200,000 in construction and trade.

Women between the ages of 20 and 34 are the primary source of new labor recruits needed. By July, 1944, war plants will need an additional 1,000,000 women and the armed forces about 200,000 more.

Total employment, including the military forces, was about 6,500,000 greater in July than in mid-1942. Nearly 90,000 additional workers were hired in July in manufacturing, raising total factory employment to 16,300,000.

West Coast To Direct Own Manpower Problem

West Coast directors of the new manpower program have served notice that administration of the plan would be on a home-town and not a Washington basis.

Following a two-day conference the regional labor-management committee of the War Manpower Commission, representing California, Washington, Oregon, Arizona and Nevada, said: "We want the communities of the West Coast to know that the new manpower program is going to be guided and administered at the local level."

Strike Hits Gary Tin Mill In Job Transfer Protest

In protest against proposed job transfers and layoffs planned by Carnegie-Illinois Steel Corp. at its Gary sheet and tin works, necessitated by the fact that WPB has reduced by 66 per cent per month allocation of tin plate to be made in the plant in fourth quarter, a sufficient number of workers left their posts to force the plant down Sept. 20. Work was resumed Sept. 22 and grievances submitted to management.

The reduction in tin plate allocation ordered by WPB required the company scale down the working force by 600. Company submitted to the United Steelworkers of America (CIO) a plan to transfer to other departments on a seniority basis.

WLB Sets Up Wage Rates For 240,000 in Buffalo

Wage rates applying to more than 240,000 metal and machinery workers in the Buffalo area were set up by Theodore W. Kheel, WPB regional chairman.

Rates ranging from 60 cents an hour for the most simple repetitive tasks to 72 cents an hour for common labor and $1.35 for class A tool and die makers was established.

Pig Iron Production Hits New All-Time High Mark in August

PIG iron production in August established a new all-time record with 5,315,633 net tons, 1432 tons more than the prior high of 5,314,201 tons in March, 1943, according to statistics of the American Iron and Steel Institute.

August tonnage compares with 5,022,745 tons in July and 5,009,084 tons in August, 1942. For the year to Sept. 1 aggregate production was 40,681,821 tons, compared with 39,491,105 tons in the comparable portion of 1942.

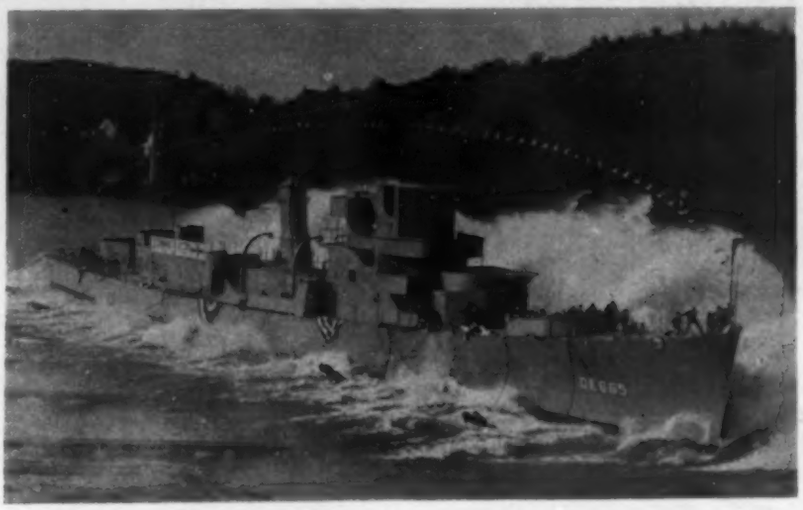
The August total included 45,798 tons of ferromanganese and spiegeleisen, bringing the cumulative tonnage for eight months to 439,742 tons, compared with 412,986 tons in eight months last year.

Operations in August were at 98 per cent of capacity, compared with 93.5 per cent in July, 97.2 per cent in August, 1942, and 96.2 per cent average for eight months.

Details of production by districts, in net tons, are shown in the accompanying table:

District	Pig iron	Ferro, spiegel	Total August	Total Year to date	Per cent capacity
Eastern	995,780	14,124	1,009,904	7,724,710	92.4
Pittsburgh-Youngstown	2,204,200	15,480	2,219,680	16,769,850	99.7
Cleveland-Detroit	528,236	.....	528,236	4,081,952	101.5
Chicago	1,139,354	.....	1,139,354	8,729,807	102.3
Southern	315,997	16,194	332,191	2,761,043	88.3
Western	86,268	.....	86,268	614,459	89.5
Total	5,269,835	45,798	5,315,633	40,681,821	98.0

American Iron and Steel Institute. Companies included above during 1942 represented 99.8 per cent of total blast furnace production.



INLAND SHIPBUILDING: The U. S. S. Jenks, first destroyer escort vessel to be launched on the Ohio river, slid off the ways of Dravo Corp.'s east shipyard, Neville Island, Pa., Sept. 11. In connection with the launching, Dravo Corp. was awarded a third star for its Army-Navy pennant

Distributors Feel Impact of War

Significant changes in movement of products through jobber channels shown by comparison of 1942 and 1940 tonnage figures. . . Warehouse total off though mill output rises

IMPACT of the war upon warehouse steel distribution is revealed by comparative figures for 1940 and 1942 prepared by the American Steel Warehouse Association.

In 1942, warehouses and jobbers received 5,937,609 net tons from producers. In 1940 they accounted for 6,686,534 tons of finished steel products. The decrease was 748,952 tons or 11.2 per cent. Total mill production, however, scored an increase of 31.3 per cent. A record high point was enjoyed by distributors in 1940 when receipts were 29 per cent above 1939, previous top year. Prior to 1939, 1929 held the record with 4,468,937 tons.

Influence of War Evident

Influence of the war was especially evident in merchant product deliveries to distributors. Galvanized sheets were down 61.4 per cent; wire products 10.5 per cent; pipe and tubes, 23.7 per cent. The decline for all merchant products was 28.5 per cent.

General steel products available for warehouses also fell far short of 1942 demand. The breakdown of the priority system was a key factor in depriving distributors of replenishments. Receipts of the general steel items dropped 21.8 per cent below tonnages delivered by producers during 1940. The critical situation which general steel warehouses experienced in 1942 is revealed by the fact that while production of these products jumped 36.2 per cent in 1942 over 1940, shipments to warehouses fell off 11.2 per cent.

Success of the Controlled Materials Plan, from the standpoint of steel warehouse distributors, is clearly apparent as the first three-month period of the full operation of the plan nears an end, W. S. Doxsey, president of the warehouse association, reported last week.

This plan permits warehouses to sell steel under clearly stipulated conditions and it provides for the replacement of the steel sold from stock in accordance with these warehouse regulations.

"Balancing of mill shipments to warehouses with warehouse sales is, of course, the essence of CMP procedure," said Mr. Doxsey. "The warehouse load directives placed by the Warehouse Branch, WPB, upon the producing mills each quarter are adjusted as necessary in accordance with statistics derived from consolidated WPB-2888 reports. Thus available supplies of each product are harmonized with demands.

"During July, the first month for which these CMP statistics are available, figures submitted by our members show that, taking the United States as a whole, for every 98 tons of general steel products delivered from warehouse stocks, 100 tons were received into inventories from all sources—86 tons came from scheduled rollings, 7.5 tons from other than scheduled rollings and 6.5 tons from persons other than producers.

"Because of the accelerated shipbuilding program which has resulted in an overall shortage of plates for all critical war purposes, it has not been possible to place upon the plate mills warehouse load directives equivalent to warehouse sales. The warehouse load directives for plates may range anywhere from 60 to 75 per cent of the total warehouse base tonnage for plates. For example, our figures for the month of July show that for every 100 tons of plates received by warehouses, 64 tons came from other than scheduled rollings and 7 tons from persons other than producers. Total receipts of plates, however, were 97 per cent of sales by warehouses in the month of July."

Conversion of so many continuous mills for production of shipbuilding plates has made heavy inroads upon facilities for the production of hot-rolled and cold-finished sheets, according to Mr. Doxsey. Recently, demands of the armed services for products made of sheets has been exceptionally heavy. However, the supply of hot-rolled and cold-finished sheets is limited and for the time being, it is likely warehouse load directives for these products will fall short of total warehouse sales.

War conditions make it impossible for the Warehouse Branch of WPB to distribute the tonnage represented by warehouse load directives in proportion to the volume of warehouse business any particular producer may have enjoyed prior to the war. Some producers, especially those equipped to make certain war materiel, may be directed to use a very high percentage of their capacities for such purposes. As a consequence, available capacities for warehouse requirements are correspondingly limited. Normal mill customer relationships cannot be preserved by the War Production Board under these conditions and warehouses occasionally find their normal sources of supply are booked to CMP limits and cannot accept additional orders. Warehouses unable to place their orders with their usual sources must explore other sources.

Scrap Shipments from Auto Graveyards Cut in August

H. M. Faust, director, War Production Board Salvage Division, announced last week that scrap shipments out of auto graveyards in August amounted to 86,882 net tons, a 10.4 per cent decrease compared with July shipments. August figure is the lowest in recent months, and far below the averages attained in the first six months of 1943.

Car purchases by auto wreckers amounted to 60,312 cars in August compared with the July figure of 60,750 cars. The August purchase figure, Mr. Faust stated, although only slightly under that of July, is considerably below that for the months previous to June 1, when cars purchased by auto wreckers averaged approximately 85,000 cars per month. Cars wrecked during August totaled 53,827.

Drain Lake To Expose Ore Body

Unusual water diversion project expected to be completed in November but ore mining operations are not scheduled to be started until next August

WATER diversion program at the Steep Rock Iron Mines across the Canadian border north of Duluth, will be completed in November, enabling Steep Rock lake to be pumped out and production of high-grade ore started by August, 1944, as planned, according to D. M. Hogarth, president.

Special interest attaches to the project for the high quality of the ore to be obtained and for the engineering problems involved.

Natural iron content of the deposits averages 56.54 per cent. Silica content is 3.42 per cent; phosphorus, .017 per cent; and sulphur, .039 per cent. Twenty-five per cent of the ore is open hearth lump suitable for "feed ore" and "charge ore."

The deposits lie under 170 to 325 feet of water. Before the ore can be mined, it is necessary to divert the Seine river, which flows into Steep Rock lake, and pump the lake dry.

To Rearrange Nature's Face

Engineers claim the problems of the tremendous undertaking are not particularly involved, but will require another year before open pit mining can start. Stages of the job include: (1) Pumping the water from Raft lake (see accompanying map) into Marmion lake; (2) lowering the level of Finlayson lake by blasting a tunnel through solid rock and dredging away a sand barrier at the Esker cut to permit the water to flow southward and form a new channel for the Seine river; (3) blasting cuts to connect Marmion lake and Finlayson lake through a control works in Raft lake; (4) diverting the Seine river by cutting off its present channel into Steep Rock lake by a dam, filling the channel to make the river reverse its course and flow through Raft and Finlayson lakes; (5) damming the eastern arm of Steep Rock lake, where the ore lies, and pumping out a billion gallons of water.

When the eastern arm is pumped dry, 31 million tons of proven and probable ore will be exposed. The property initially will be equipped to produce ore at a rate of 2,000,000 tons a year and this rate can be increased as necessary. Ultimate tonnage of ore to be produced is believed to be much greater than 31,000,000 tons.

Agreement has been reached with officials of the Dominion government and the Canadian National railways whereby a spur line some four miles in length will be built into the property, and suitable loading docks constructed at Port Arthur. Ore will be shipped to Port Arthur by rail and from thence to lower lake consuming ports by vessel.

To finance the project, the United States and Dominion governments are putting up approximately $9,000,000 in addition to about $3,000,000 in private capital. Largest contributor is the Reconstruction Finance Corp. which is supplying $5,000,000. This money will not be used until the funds of the Steep Rock company, received from sale of debentures and stock, are exhausted. If the RFC's $5,000,000 is not sufficient to complete the water diversion and get the property into production, the Steep Rock company's exclusive sales agent, Premium Iron Ores Ltd. has agreed to supply an additional $1,000,000.

Construct Power Line

The Hydro-Electric Power Commission of Ontario has undertaken to construct a 125-mile power line from Port Arthur to the mine at a cost of around $1,600,000. The spur railway line to the mine and the loading docks at Port Arthur, to be financed by the Canadian government, will cost an estimated $2,500,000.

In reporting on the progress of the project to stockholders, President Hogarth said 83 per cent of the 1,100,000 cubic yards of earth already have been moved and that the work will be completed about Nov. 1. Finlayson lake has been lowered 27 of the 45 feet intended by the tunnel.

Removal of rock is well under way at the Raft lake cut and is scheduled to be completed early in November. All preliminary work either is ahead of schedule or completed.

Dams at the Narrows of Steep Rock lake and other work essential to the diversion are progressing satisfactorily. Six main construction camps have been built

Map of the Steep Rock lake region. The Seine river which flows into the lake will be diverted to flow through Raft lake into Finlayson and thence into a new channel to the Southwest. Steep Rock lake must be pumped out before mining operations begin

Initial step in diversion of Seine river from Steep Rock lake. Waters of Finlayson lake are draining through a temporary tunnel preparatory to directing flow of river into new channel

and mine buildings and houses are nearly completed.

Presence of iron ore under Steep Rock lake has been inferred for many years by geologists because more than 60 years ago explorers found large quantities of hard float ore of good grade along the south shore. Theory was that it was cast up from the lake bottom by glacial action millions of years ago.

In 1938, the Steerola Exploration Co. Ltd. was organized and proved the theory by drilling through the ice covering of the lake that winter. The drilling revealed the ore bodies.

The following year the Steep Rock Iron Mines Ltd. was organized and acquired all the assets of Steerola in exchange for stock.

Postwar sales and marketing programs to provide assurance of continuing outlets for the entire output of Steep Rock ore now are virtually complete, according to Cyrus S. Eaton, Cleveland industrialist who heads Premium Iron Ores Ltd.

Decentralization of Operations Function Planned by WPB

SWEEPING decentralization of the whole operations function of the War Production Board is under way. This was announced last week by H. G. Batcheller, operations vice chairman.

Goals of a new program, representing the maturing of a policy which has been evolving for several weeks and which was adopted at the first meeting of a newly established WPB Operations Council, include:

A possible 33 per cent reduction of necessary travel by businessmen to and from Washington; a slashing of their routines of paper work by as much as 40 per cent; and an organization geared to greater speed and responsiveness.

Much of the machinery of production control will be moved out of Washington to the WPB regional offices, although it is understood on the very highest authority that it is not contemplated at this time to move any part of the Steel Division from Washington. Consideration is being given, however, to ascertain what activities of this division can be transferred, if necessary, to various field offices. Daily reports to WPB by steel producers will not be required after Sept. 30.

Greater autonomy and consequently greater responsibility for the 13 regional offices and the 92 district offices of the agency will move out of Washington with whatever machinery of production control is transferred. It is believed that the program will create, in effect, 13 "little WPB's", able to function without active assistance from Washington except in basic policy matters and in the instance of problems which are beyond their own resources. Each regional director now will be known as a "regional chairman".

Position of deputy vice chairman for field operations has been abolished, since the regional chairman will work directly with the Operations Council. A new field service office, under Harcourt Amory, will channel certain information and services to the regional and district offices. Mr. Amory formerly was assistant to the operations vice chairman.

Semimonthly Meetings Planned

The Operations Council—which consists of the regional chairman and executives of the WPB operation office—will meet every two weeks in Washington for the purpose of ironing out organizational details and facilitating the decentralization process.

The primary aim of the move is to produce greater speed and efficiency throughout the entire process of operations administration, but one of the first and most visible results is expected to be a slackening of the almost legendary tensions connected with doing business in Washington.

A study instituted by Mr. Batcheller shortly after he assumed his present position in June convinced him that a surprising percentage of the applications for priority assistance and allocations handled in Washington could be handled just as competently in the regional centers and usually in much less time. It is hoped that by the end of the year a major portion of the agency's paper work will be handled in the local offices. At that time only overall controls will still remain in the capital, if current plans carry through.

The "production representative" system which has been operating in the field for some time will be considerably expanded and the duties of these engineers, consultants and practical production men who have worked so close to industry will be amplified. They will have the specific assignment of breaking bottlenecks and providing special service to producing units for which WPB has prime responsibility. Particular attention and help will be directed toward the maintenance of the exacting delivery schedules. These schedules will still be set up in Washington, but they will be checked in the local WPB offices.

War Contractors Hampered and Harried Under Present Law

Testimony of industrialists before House Ways and Means Committee develops varying shades of opinion but all urge change in procedure. . . Duress on part of renegotiators alleged by some witnesses

WASHINGTON

WAR contractors who testified before the House Ways and Means Committee at recent hearings on the Renegotiation act expressed varying shades of opinion —but all were unanimous in finding fault with the renegotiation law as it now stands.

As spokesman for the National Association of Manufacturers, E. O. Shreve, vice president, General Electric Co., Schenectady, N. Y., accompanied by tax experts of the association, testified that the renegotiation process takes too much time of business executives from war production, and that this burden is especially hampering to smaller companies. Furthermore, it creates considerable uncertainty in the determination of a company's financial position.

Mr. Shreve said he believed it was unwise for Congress to delegate part of its power to levy taxes to groups of men and trusting to their judgment. In 1942 the law seemed desirable as a war emergency measure, he declared, at that time the cost of producing many war items not being known. This condition has been radically altered since. Too, it was not until this year that the full effect of the 1942 revenue law in removing excess profits has been fully appreciated.

Asks For Act's Repeal

It is apparent, Mr. Greve said, the Contracts Renegotiation act should be repealed and the price adjustment boards dismissed. Acknowledging that some contracting still to be done may involve items whose manufacturing costs will have to be developed he felt it would be a simple matter for procurement officers to stipulate in these contracts that the price later on would be subject to revision on the basis of costs. He thought it advisable to confine further renegotiation to contracts placed before Jan. 1, 1943.

In the exchange of questions and answers it was brought out that a number of committee members are apprehensive over the fact that, as Mr. Shreve put it, "the cards are all on the side of government" in this matter of renegotiation. Committee members wanted to know why more contractors did not appear to voice their grievances. Mr. Shreve said it was not considered good policy to appeal to the courts or to Congress in an attempt to get a price adjustment board's ruling altered.

One point brought out at the hearing was that renegotiation threatens the financial solvency of contractors; banks hesitate to make loans to manufacturers who are undergoing renegotiation and who have no idea what profits they will be allowed to retain.

F. N. Bard, president, Barco Mfg. Co., Chicago, who appeared as spokesman for the Illinois Manufacturers Association, declared the Contracts Renegotiation act has outlived its usefulness.

Should Congress be unable to agree to repeal the law, Mr. Bard said, it should be amended to permit a contractor to terminate the contract upon some reasonable basis if the refixed price is not acceptable.

Pay Out of Own Pocket

Asked "What is the situation surrounding your working-capital position if there should be a sudden termination of the war and cancellation of contracts?", Mr. Bard replied:

"I would not have the slightest idea. This is one of the principal worries of most contractors. It would be a serious matter, because we have to turn our capital over quickly in order to stay within our capital structure. That is one reason for now allowing the secretaries to take and withhold payments that are currently due, because these payments are largely for labor and material; they are out-of-pocket payments. They are not depreciation and things that come out of capital. . . . Many contractors cannot carry on if the secretary arbitrarily holds out sums of money that should be currently turned over to them. . . . In almost all these rules the secretary may do as he pleases."

Edward E. Butler, executive vice president, Vinco Corp., Detroit, who appeared for the Automotive Tool and Manufacturers Association, Detroit, an organization of some 200 "small" manufacturers, said renegotiation endangers the future solvency of such manufacturers. He declared that the renegotiators are not allowing "reasonable" profits, as they claim.

Ernest W. Schneider, vice-president, Hudson Screw Machine Products Co., testifying as vice president, Screw Machine Products Association, said this industry has expanded its capacity on a vast scale and has done it largely with its own capital. At the same time, large numbers of the newest screw machines have been installed in plants of companies that normally are large customers. At the end of the war the screw machine products plants on the average will contain much less of this modern, low-cost producing equipment and hence will have problems recapturing their old markets.

Had the industry had any inklings that a drastic renegotiation program lay ahead it never would have been able to afford its large capital investment. Its future financial solvency, Mr. Schneider declared, is threatened by the renegotiation process.

Henry W. Jones Jr., president, American Tube Bending Co., New Haven, Conn., told about the high cost of plant expansion and of the development work required in stepping up production of tubular assemblies, largely for the airplane industry. The company has met these expenses out of its own funds. Whereas during the last four calendar years its total profit after taxes was $211,000, it has invested $218,000 of its own money in expansion.

On $3,000,000 sales in 1942, after voluntarily reducing prices several hundred thousand dollars, the company's profit before taxes was $481,000, or 15.7 per cent. Taxes took $352,000, or 73 per cent of the profit, and the company had left $129,000, of which $101,000 went into its plant. The company went into 1942 with a debt of $236,000. This was made up completely during the year and there remained a little more than was required to pay the first income tax installment due in March of 1943. At the beginning of this year the company again went into debt for $111,000 in order to carry on its war production.

The company's main problem, said Mr. Jones is: "How shall we pay our taxes? The answer lies in current earnings for subsequent years until the war ends . . . . We are now being renegotiated for 1942. . . . Renegotiation of war business is a constant and serious threat to our continuing in business. From my observation, the administration of this act follows no pattern and is entirely without any basic plan. I feel that it is discriminatory, that it penalizes initiative, and that it kills incentive of thousands of small manufacturers to help to win the war. . . . We have been asked for a refund out of earnings of $185,000 before taxes, money we will have to borrow or take from future earnings to pay."

"No Postwar Reserve"

At this point Rep. Wesley E. Disney (D. Okla.) said: "Last year we provided for a 10 per cent postwar reserve. Now, if a taxpayer pays in a million dollars to the Price Adjustment Board he does not get any $100,000 postwar reserve. That is out and gone as far as he is concerned. It is an argument for handling this through an excess or an excessive profits statute. Now, it is said that it has to be handled by the tax bill; the whole thing has to be handled by the tax bill, but the Price Adjustment Boards, either within this law or outside of it, are taking the very thing away from indus-

try that we intended last year it should have."

J. F. Lincoln, president, Lincoln Electric Co., Cleveland, said if the renegotiators do what they expect to do, "that is the end of the Lincoln Electric Co. and the end of a lifetime of work of a lot of people, and it also is the end of a good many hundreds of stockholders who work with their hands in that factory and who are making production records which make this country the arsenal of democracy."

Mr. Lincoln said he knows of one contractor that has been renegotiated to a degree which has put him in a dangerous financial condition. When this contractor demurred, said Mr. Lincoln, Under Secretary of War Patterson said: "You will agree to that payment now, or we will expose you in the papers; we will hold from you every dollar that your government owes you and we will not allow any government contract to be placed with you unless you are so far below anybody else we can do nothing else".

This was the first case of coercion, so often inferred during the hearings, actually revealed. Mr. Lincoln referred the committee to Judge Patterson for the name of the contractor.

Walter Harnischfeger, president, Harnischfeger Corp., Milwaukee, said durable goods cannot be given away during periods of depression. In 1929 his company made $1,200,000 on sales of $12,000,000; at the bottom of the depression losses were at the rate of several million dollars annually.

Cut Profits in Half

In 1942 the company shipped $36,000,000 worth of equipment for war use, doing this business on its own capital. It is paying about $10,000,000 in taxes on last year's business, retaining $1,450,000 as profits after taxes. The renegotiation board recently asked for a price reduction of $6,000,000 which would cut the gross profit in half and reduce the Harnischfeger $2,000,000 surplus by half.

Percy Rydings, vice president, Syracuse Supply Co., Syracuse, N. Y., appeared on behalf of the National and the Southern Supply and Machinery Distributors Associations. The renegotiation act, he said, as originally passed probably was not intended to include business of this type and Mr. Rydings recommended that the act be amended to exempt from its provisions standard commercial articles normally and regularly produced during peacetime as well as under war conditions. Renegotiation, he said, takes practically all of the distributors' profits from them.

Another witness complained that the price adjustment boards take in their hands all power not reserved by Congress. Another told of an instance of coercion where a member of a board agreed not to touch salary increases if the company accepted the terms.

A bitter complaint, in a letter from the Equitable Equipment Co. Inc., New Orleans, was entered in the record. It stated that the War Price Adjustment Board had allowed it to retain, after taxes, $19,500 on gross sales of $2,337,000 in 1942, despite the fact that in 1940, when it established its shipyard, it had a profit of 0.6 per cent after taxes, and in 1941, when it was learning to build vessels and paying for the experience, it took a loss of 1.75 per cent.

Ellsworth C. Alvord, representing the United States Chamber of Commerce, expressed the opinion the renegotiation act is unconstitutional because it authorizes procurement agencies to make profits decisions while denying the renegotiated contractors any redress under the law. He urged strongly that the act be repealed and that the revenue law be amended so as to recover all excessive profits through the process of taxation.

Mr. Alvord cited some instances of duress, such as the following statements by members of regional price adjustment boards:

"You will be reported to the Congress";

"Your case will be widely publicized";

"You will receive no new contracts";

"Your existing contract commitments will be cut back";

"Your existing contracts will be terminated";

"We will be compelled to make an extensive audit in your case";

"You have received the best treatment of anyone in your industry";

"Your allowable rate of profit for next year will be considerably reduced";

"You may appeal to Washington, but Washington invariably sustains us";

"You may appeal to Washington, but you will get worse treatment";

"Funds now due you will be withheld".

Thorvald S. Ross, president, Rivett Lathe & Grinder Co., Boston, also acting as spokesman for the National Machine Tool Builders' Association, was another witness who held that renegotiation is unfair to his company in view of the fact the proposed settlement does not allow the company to keep reserves that will be needed in the postwar period.

Other witnesses who elaborated along much these same lines included L. Y. Spear, president, Electric Boat Co., New London, Conn.; Ralph S. Damon, vice president and general manager, American Air Lines Inc., also representing a number of airplane manufacturers, and Francis A. Callery, vice president, Consolidated Vultee Aircraft Corp., and also representing a number of other airplane manufacturers; Charles N. Safford, treasurer, Lovejoy Tool Co., Springfield, Vt.; Duncan Rice, Auto Specialties Mfg. Co., St. Joseph, Mich.; William J. Kelly, Kelly-O'Leary Steel Works, Chicago, and president, Machinery and Allied Products Institute, Chicago; Willard F. Rockwell, chairman, Timken-Detroit Axle Co., Detroit.

Threats Interest Committeemen

From the beginning of the hearing reports of threats to companies that have resisted the decisions of the renegotiating boards have interested committeemen. In the testimony of Willard F. Rockwell, chairman, Timken-Detroit Axle Co., the point was brought out by Mr. Rockwell "whether it is intentional or not, we have been told very plainly what happened to people like Warner & Swasey."

Representative Knutson asked Mr. Rockwell what happened to that firm and Rockwell replied he had heard Warner & Swasey had been threatened with having all their bank accounts attached, or their orders canceled, and that the Army would take over the company.

Rumors around the hearing that some manufacturers had been warned they would get a worse deal if they complained are thought to have prompted Under Secretary of War Patterson in his testimony to introduce a chart of financial affairs of the Warner & Swasey Co. for the past seven years.

Mr. Patterson said a refund of $5,500,000 proposed to the Warner & Swasey Co. has been accepted, and he denied charges of bullying and threats by the renegotiators. He admitted the machine tool industry faces a serious problem after the war.

CHANGES PROPOSED

Senator Carl Hatch (N. Mex.) last week introduced a bill proposing a single government board to replace the present price adjustment boards and to formulate and publish policies so that contractors may more clearly understand renegotiation procedure.

Under this new measure a contractor could win exemption by showing profits before deduction of income and excess profits taxes did not exceed 8 per cent of his total sales; also he would have to show his total sales were not more than three times his average total sales during 1938 and 1939 inclusive. Also the board would be impartial and contractors would have the right of appeal.

At the same time the House Naval Affairs Committee has introduced a bill calling for termination of the Contracts Renegotiation act as of Jan. 1, 1944, and future recovery of excessive profits through a super tax which would at the same time be not too high to prevent contractors from accumulating postwar reserves.

Indications are eventual repeal or revision of the renegotiation act will be much more drastic than suggested by the above proposals after the Ways and Means Committee completes its hearings and makes its recommendations.

WINDOWS of WASHINGTON

Army Trains Technicians

AFTER the war a huge supply of skilled technicians will become available to industry as a result of the thorough course of instruction in various ordnance field stations. Fire control course teaches electricity, radio and oil gear principles. Mechanic courses teach ignition, bearings, clutch, transmission and numerous other automotive specialties. Machinist courses teach the operation of machine tools and other equipment and the design and maintenance of cutting tools. Ordnance also has many men trained to design new tools.

Another Labor Reservoir

Manufacturers confronted with a labor shortage will do well to get in contact with the nearest regional office of the United States Veterans' Administration. This is the agency charged with the responsibility of seeing to it that wounded or crippled soldiers, upon discharge, are rehabilitated and thus enabled to get jobs in industry. The number of soldiers in hospitals is increasing and they will start to become available in substantial numbers early next year. The Veterans' Administration is prepared to enter into contracts with manufacturers and schools of various types and will bear all the expense of training these men, in addition to paying them a pension of $80 monthly when single and $90 when married.

Take Care of Your Truck

Office of Defense Transportation, as a part of its effort to make motor trucks last longer, is about to issue a pamphlet giving instructions as to the proper care and maintenance of automotive cooling systems. Prepared by the Society of Automotive Engineers, it covers such subjects as the cleaning and flushing of the cooling system, rust prevention, the use of antifreeze solutions and so on.

Munitions Savings Mount

Army Ordnance Department reports that savings in the production of war materiel now aggregate millions of dollars each month and are increasing. Cost for the entire 0.50 caliber antiaircraft machine gun, for example, has been reduced 50 per cent. Cost of one part of this gun was cut from $2 to 30 cents and the cost of another part was reduced more than 80 per cent. Ordnance also has done much in the direction of conservation. On the basis of Army requirements for 1943 it estimates that sufficient aluminum is being released to build more than 20,000 fighter planes, sufficient copper for four billion extra rounds of caliber .50 ammunition and enough steel for construction of 31,000 railroad cars. It also has found ways and means of releasing some 64,000,000 pounds of nickel, 4,300,000 pounds of molybdenum, 17,500,000 pounds of chromium and 5,200,000 pounds of tin for other uses. All this is the result of suggestions screened and processed by 112 industrial experts in the 13 ordnance procurement districts. Thus far 2806 suggestions have been received, 2339 have been processed and more than 50 per cent have been placed in production lines.

Petroleum Shipments Heavy

At least 65 per cent of all Army and Navy shipments to our armed forces all over the world involve petroleum products. In Sicily hourly requirements of gasoline came to 18,000 gallons, and they were supplied largely in 5-gallon cans. Today, as a result of extensive experiments by the Ordnance Department, the Army Ground Forces use only one type of gasoline for gasoline-powered engines, and three types of fuel oil for diesel engines. Ten varieties of engine oil have been slashed to three. On Sicily only two kinds had to be provided—for water-cooled and air-cooled engines.

CLEANING HOUSE

When Chester Bowles came to Washington late in July to take over as general manager of the Office of Price Administration he said he would "clean house". Since then he has moved "professors" out of policy-making jobs and he has placed experienced businessmen in such posts. He has increased the number of industry advisory councils to nearly 300.

Six of the seven top policy-making officials were removed. Grade labelling requirements have been taken off some 20 price regulations and an effort made to set up the standards used by various sections of business, as in meat. More emphasis has been placed on "compliance" with OPA orders rather than on "enforcement". In addition, Mr. Bowles has gone a long way in decentralizing OPA, with the regional officers working directly with merchants and manufacturers to get co-operation for OPA. The whole setup is much better than before.

Cordage Fibre Needed

The campaign aimed at conserving cordage fiber, now a serious problem, is being developed. It is expected the campaign will be financed by industry; it will be sponsored by the Conservation Division of the War Production Board. Edwin G. Roos, Plymouth Cordage Co., North Plymouth, Mass., has been appointed by the War Advertising Council to prepare the campaign.

Auditing Absenteeism

Auditing Absenteeism is the title of a pamphlet now available from the Department of Labor. It contains sample record forms of many manufacturers, together with standard methods of computing absenteeism rates. In particular, it goes into detail on the fine systems adopted and operated by Carnegie-Illinois Steel Corp., Sonoco Products Co., Owens-Illinois Pacific Coast Co., Consolidated Vultee Aircraft Corp., Summerill Tubing Co., National Lead Co.'s Titanium Division and Revere Copper & Brass Inc. It is a pamphlet which should be carefully studied by every personnel manager.

Conservation Pushed

One of the most important objectives at present is to get full co-operation of the public to save such critical resources as manpower, equipment, materials and fuel through economical use of transportation, communications, coal, petroleum products, gas, electricity and water. This campaign of conservation, launched on Sept. 15 by full-page public utility advertisements and in radio broadcasts, will be intensified.

Garden Tools in War

Manufacturers of all kinds of garden tools are losing considerable business under lend-lease transactions. The Army in various war areas is operating Victory gardens occupying about 14,000 acres—and this acreage is being expanded. Practically all the equipment needed to grow these Victory gardens is being furnished by British manufacturers.

Road Builders Look Ahead

American Road Builders Association has launched a campaign to encourage the federal agencies, states and communities, to prepare plans now for highway and airport construction and have these plans available for instant execution after the war. It finds there has been too much disposition to "prepare" and "think" about postwar planning and that the time has come to get finished plans on the shelf so they can be taken down and put into execution when work is needed. Its immediate objective is development of plans calling for an annual outlay of $3,000,000,000 for at least five years to come. For every $100,000,000 spent on highways and airports, it estimates this means eventual business transactions coming to $315,602,700 of which $131,019,400 goes into producer goods investment and $38,595,400 into producer goods reinvestment. A big demand for road building equipment is foreseen after the war, particularly because of the rapidity with which road-building equipment is wearing out. A good many communities have given road-building equipment, snow removers and so on to the armed forces and will need replacements.

Equipment Needs Mount as Allied Forces Step Up Attack on Axis

Bulldozers, tractors, excavating shovels and other heavy machinery now considered military end products. . . Overseas demands necessitate 21 per cent production increase in 1943 despite drastic drop in construction on home front

WASHINGTON

INCREASED overseas military and lend-lease demands will require production of at least 21 per cent more construction machinery in 1943, despite this year's estimated reduction of 43 per cent in home front construction work, according to the Construction Machinery Division, War Production Board.

Today, bulldozers, tractors, excavating shovels and other heavy construction equipment of this type are military end products. They are needed to pull artillery and supplies, load ships, clear roads through forests, fill bomb-pocked airfield runways and do the thousand and one other bulldozing, hauling, dirt-moving, and material handling jobs that must be done in a hurry, often under fire.

Military demand for construction equipment has mounted steadily, with 60 per cent of 1941 production required for military purposes, 75 per cent of the 1942 production, and about 90 per cent of this year's output. The percentage needed to fill military demand in 1944 may be even higher.

To assure prompt meeting of delivery schedules an expediting unit was set up in the Construction Machinery Division in April, 1943. The unit assists the 458 manufacturers in the construction machinery field in obtaining hard-to-get materials and components and takes whatever action is indicated to get the orders shipped on time. To date, it has handled 523 requests for such items as engines, bearings, steel, lumber, nuts and bolts, etc., and has succeeded in getting the needed material to the right place at the right time in 480 cases.

Time required in handling cases varies from a few hours to 10 weeks, division officials report. Record for speed was made in one case, completed in half an hour. Cargo space had been reserved for 124 bituminous spreaders urgently needed overseas. The order was completed except for fire extinguishers, one for each spreader, and the expediting unit was asked to assist in obtaining these 124 extinguishers. It found out that the Corps of Engineers had an order for 2000 extinguishers of the same type and specifications which was blocking delivery. In a half hour, permission was secured from the Corps for release of 124 extinguishers ahead of time for use in the waiting spreaders, and that particular case was solved.

By contrast, one of the complex cases handled by the unit was for 10 shovels ordered under lend-lease. These shovels called for materials and parts of unusual specifications, normally requiring from 4 to 5 months processing time. The company with which the order had been placed was swamped with Navy orders for shovels of an entirely different type, and it seemed all but impossible to get the lend-lease shovels out on time. Permission was obtained from the Navy to fit the 10-shovel order into the company's production schedule. The various special materials needed were rounded up and delivered on the dot. At the end of 5 weeks everything was in place except special electrical adapting equipment requiring 8 to 9 weeks to build. The incompleted lend-lease shovels were moved out of the way to a warehouse rented with lend-lease funds—the electrical equipment was installed and in 10 weeks, instead of 4 to 5 months, the shovels were on their way.

New Conservation Chart for Bronze Castings Issued

A new edition of the conservation chart for brass and bronze castings was issued last week by the Conservation Division, War Production Board. It has been prepared to guide engineers and designers in specifying less critical grades.

This chart replaces the down-grading chart issued by the division in January. The use of the new substitution chart for conservation in brass and bronze casting by specifications change is explained by Carter S. Cole, chief of the Metals Branch of the Conservation Division as follows:

"Real conservation, where copper alloys are necessary because of engineering requirements, can be effected by specification changes based on a critical examination of end use. The primary objective of this work is a better utilization of available material for maximum efficiency in the war effort. Such changes are the designing engineer's responsibility. The chart can serve as his guide and the accompanying table gives a ready cross-reference to the applicable approximately equivalent specifications.

"Designing engineers have utilized the previous chart in making specification changes that have made efficient use of our supplies of secondary and scrap material. In nine months, during which foundry output has increased 17 per cent, use of new copper by ingot makers and foundrymen has decreased 22 per cent. That represents an achievement in conservation which is saving thousands of tons of primary copper per month.

"Since publication of the original chart in January, the material supply situation has changed. Today, tin-bearing copper-base alloy scrap is much less readily available. On the other hand, fired cartridge cases are being returned from the battlefields in quantities in excess of that which can be readily used by the brass mills. These make excellent material for the ingot maker compounding regular manganese bronze.

"Consequently, in this reissue of the chart, emphasis is placed on the desirability of changes into manganese bronze and yellow brass and less emphasis is placed on changes into the secondary tin-bearing copper-base alloys."

Is It Essential in War Effort?

Further drastic cut in public and industrial construction looms for 1944. . . Project approval hinges on military needs. . . Manpower, material conservation sought

FURTHER restriction of public and industrial construction is in prospect for 1944. The War Production Board, it is reported, plans to hold such construction activity to $3,000,000,000 in value next year. Stringent new tests, it is understood, will be invoked before materials are released for approved projects.

If this tentative limit on 1944 construction is effected it will represent a 50 per cent reduction from 1943 volume and an even greater cut from the $14,000,000,000 volume in 1942.

While a manpower shortage is given as the chief reason for futher restriction of construction, shortages of such raw materials as lumber and steel also are important factors. The War Manpower Commission estimates 600,000 men can be shifted from the building and buildings materials trades to war industry if construction is limited to three billion dollars.

Next year proposed construction projects will have to be approved by either the industrial or the non-industrial facilities review committees of the WPB, which agencies will recommend whether or not materials can be released. Each project will be decided on its merits, essentiality being determined on the project's need in the war effort.

The trend toward holding down construction is indicated by the recent decision of the government to cut the proposed $95,000,000 program for synthetic rubber tire expansion to approximately $30,000,000, largely for equipment.

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We don't claim CINCINNATI Milling Machines will cure Absentasia. But, we do say that if you put men on machines they enjoy running — machines easy to handle — you take a long step forward in the reduction of fatigue, one of the favorite reasons for absenteeism. And real or imaginary, fatigue takes a heavy toll of man hours at a time when they're needed most. ¶ All CINCINNATIS are designed for maximum efficiency and usefulness with a minimum of operator energy — important considerations always, but especially desirable in times like these. The engineers here at Milling Headquarters will be glad to tell you more about it. ¶ Look in Sweet's Catalog File for Mechanical Industries for brief description of all CINCINNATI Machines. Write for complete specification catalog on machine in which you are interested.

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Above: Rough and finish mill gripper edge on cylinder body. The machine is a No. 3 Vertical Dial Type.

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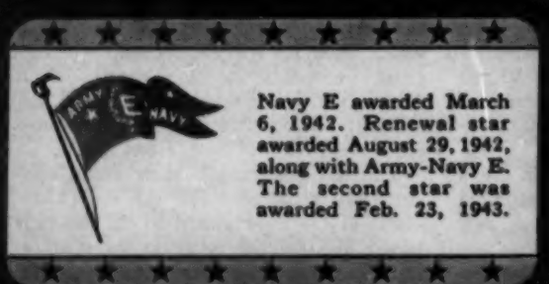

Navy E awarded March 6, 1942. Renewal star awarded August 29, 1942, along with Army-Navy E. The second star was awarded Feb. 23, 1943.

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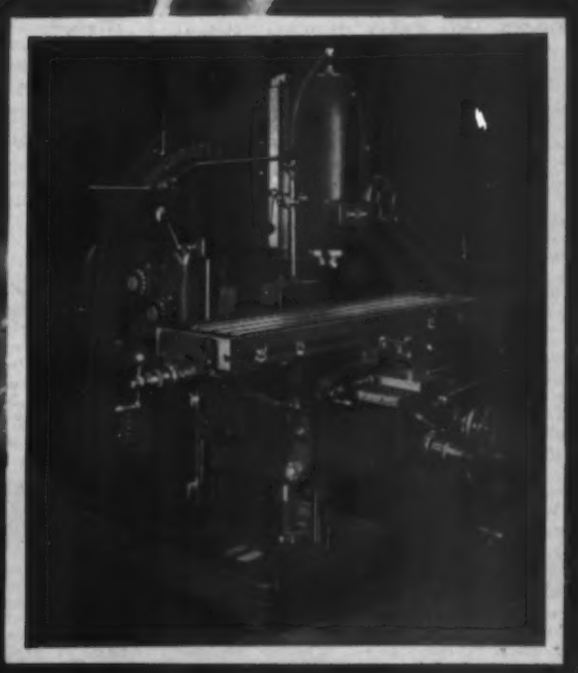

Right: CINCINNATI No. 3 Vertical Dial Type. Specification catalog M-970-1 gives complete information. Send for your copy today.

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PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives, issued by War Production Board and Office of Price Administration

INSTRUCTIONS

COPPER FLAKE POWDER: Copper flake powder is not included in the term "copper or copper-base alloy powder" appearing in schedule I of CMP regulation No. 1 and, consequently, is not a controlled material. It continues to be governed by provisions of orders M-9-b and M-9-c and other applicable WPB orders.

CLAIMANT AGENCY SYMBOLS: Manufacturers operating under the Controlled Materials Plan must not attempt to trace the ultimate end use of their products for the purpose of indicating the claimant agency pattern which is required in section A of form CMP-4B application. Applicants must analyze order on the basis of claimant agency symbols appearing on their customers' orders in making application for controlled materials. If no claimant agency symbol appears, the order must be reported under "unidentified."

A person who receives a rated order must accept and fill it in accordance with the terms of priorities regulation No. 1, whether or not it is identified by a claimant agency symbol. He may not assume that his customer is required to show a symbol on his order since in many cases it is not necessary to do so in applying and extending a rating.

SPECIAL ALLOTMENT PROCEDURE: Operation of the special allotment procedure, established by direction No. 22 to CMP regulation No. 1, has been extended through the first and second quarters of 1944. This procedure permits manufacturers of class A products who do not receive allotments from their customers in time to permit them to make full use of them to apply for special allotments, either to the appropriate WPB industry division or claimant agency.

COPPER AND BRASS ORDERS: Orders for copper and copper-base alloy controlled materials, bearing allotment numbers of the Office of Economic Warfare or the Office of Lend-Lease Administration may be accepted by brass mills, copper wire mills and copper and copper-base alloy foundries, even though the date and place of delivery are not specified. Such orders must be complete in all other details and must be validated with allotments which are valid for the quarter in which the material is to be produced. In such cases, producers may hold such material for the account of their customers, and may make delivery at such time and place as the customer later may specify.

In order to permit brass mill operators to schedule mill operations at capacity, the armed services have agreed to a cutoff date on directives covering ammunition brass strip, rod, and tube production. On the last day of each month, brass mills will close their order books for the following month as far as ammunition brass strip, rod and tube are concerned. The operator must report immediately thereafter to the WPB any open capacity for producing such items and WPB will schedule the open capacity.

Brass mills may not produce any type K, L or M water tubing until they have received specific written authorization from WPB to fill orders for it. Application for authorization to produce such water tubing may be made by brass mills to the Copper Recovery Branch, WPB, 200 Madison avenue, New York. The application should state the name of the person seeking to place, or who has placed, the order for such tubing, and the quantity, type, and size of the tubing required to fill the order.

CMP REGULATIONS

MRO SUPPLIES: Preference ratings assigned for maintenance, repair and operating supplies under CMP regulation No. 5 have been adjusted to a new pattern of relative industrial importance, recently established by the requirements committee. Schedules I and II of the regulation, which indicate the ratings assigned to producers of particular products and to particular industries, have been modified to reflect the existence of specific MRO preference rating orders which are applicable to specific industries. (CMP No. 5)

(Orders placed for MRO items prior to Aug. 16, 1943, for delivery in the third and fourth quarters, need not be down-rated in the case of producers of products or business which have been moved from schedule I to schedule II by the above amendment)

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L ORDERS

TIRE RECAPPING EQUIPMENT: Office of Rubber Director does not contemplate the authorization after Oct. 1 of additional recapping facilities. Production of such facilities thereafter will be confined to MRO and equipment for necessary replacements. Manufacturers of full circle and sectional molds, matrices, curing rings, steam chambers or kettle curing devices must submit a list of their unfilled orders as of Oct. 1, 1943. (L-61)

HEATING SYSTEM CONTROLS: Certain types of heating system controls have been removed from the distribution restrictions of order L-79. This action removes those controls listed in schedule A of the revised order from distribution restrictions which required a purchaser to obtain an A-10 or higher rating. (L-79)

SAFETY EQUIPMENT: Restrictions on use of critical materials in manufacture of safety equipment have been eased. Aluminum may be used in specified parts of respirators, gas masks, oxygen breathing apparatus and goggles where other less scarce materials are not practicable; magnesium in place of aluminum is required wherever practicable. Application may be made to WPB for authorization to use aluminum in machine guards. Restrictions on use of magnesium are removed. Use of copper wire side screens is permitted for safety goggles; copper-base alloy, nickel silver and nickel plating is permitted in certain slipover type industrial safety spectacles. Nickel plating for spectacle type goggles is permitted indefinitely. (L-114)

GENERAL INDUSTRIAL EQUIPMENT: Exemption from rating restrictions of order L-123 for items of general industrial equipment frequently used on farms has been extended from Sept. 1 to Dec. 1, 1943. Farmers may obtain these items without A-1-c or higher ratings by certifying to their dealers that they are farmers and need the equipment in operating their farms. (L-123)

AUTOMOTIVE VALVES: Use of chromium and nickel in automotive intake valves, as well as exhaust valves, now is restricted. No material other than carbon steel may be used in the manufacture of intake valves, except by specific WPB authorization. Maximum percentages of chromium or nickel permitted in exhaust valves for specified types of automotive vehicles remain unchanged. Optional maximum percentages of chromium, nickel and tungsten permitted in all exhaust valves now are established, provided that where these percentages are used the steel must be produced from a melting charge of which not less than 90% is aircraft valve steel scrap. Optional maximum percentages are: Chromium, 15%; nickel, 15%; tungsten, 3%. Intake and exhaust valves for the military services are exempt from the restrictions imposed. (L-128).

ARMORED CABLE: Order prohibiting the manufacture of armored cable, as defined, has been revoked by WPB. (L-165)

CONVEYING MACHINERY: "Upstream sales" of unused conveying machinery and mechanical power transmission equipment now are permitted without ratings of AA-5 or higher, as formerly required. A purchase order, which will return unused equipment to the person from whom it was originally bought, is exempted from rating restrictions. Restrictions on use of metal in repair parts have been relaxed to some extent. (L-193)

GOLD MINES: An amendment to order L-208 provides that "operations" means any and all work in and about a mining enterprise and includes not only mining but treatment of ore or placer material from any enterprise. It also includes all prospecting, exploration work, and development work. The amendment also provides schedule A to replace a similar schedule which had been eliminated from preference schedule P-56. It also prevents the disposition of machinery without specific WPB approval except to any producer who holds a serial number issued under P-56, P-58, or P-73. (L-208)

HOT-ROLLED STEEL BARS: In order to reduce to a minimum the number of sections and sizes of hot-rolled carbon steel bars which mills are required to roll and to obtain maximum production from available facilities, WPB has issued a schedule of permitted sizes. The schedule, No. 15, will effect a cut of 40% in sizes and is expected to permit an increase of 10% in production as well as release some facilities for other purposes. (L-211)

FOUNTAIN PENS AND PENCILS: Under terms of orders L-227 and L-227-a, production and distribution after Oct. 1 of fountain pens, mechanical pencils and pen nibs to fill special orders for specified government agencies must be specifically approved on WPB-2719 (formerly PD-880). Each manufacturer must file this form with WPB on or before the 15th of March, June, September and December, showing his proposed production and delivery. Production of fountain pens and mechanical pencils (under L-227) and of pen nibs (under L-227-a) for general distribution will be on basis of a certain percentage of each producer's 1941 output. Production is limited quarterly as follows: 5.5% of steel pen nib fountain pens, 7.5% of gold pen nib fountain pens, 5.0% of mechanical pencils and 28.5% of the pen nibs produced during 1941. Order L-227-b limits quarterly production of wood-case pencils to 20.25% and of pen holders to 24% of number produced in 1941. (L-227, a, and b)

STEEL VALVES: Producers of valves for use as part of the equipment of aircraft or watercraft, other than pleasure craft, are relieved of the requirement of having firm orders

as a prerequisite for making such valves. (L-252)

PHOTOGRAPHIC AND PROJECTION EQUIPMENT: Production and distribution of photographic and projection equipment, accessories and parts are now subject to specific approval by WPB. Manufacturers must file WPB-3038 on Oct. 1 and on or before the 15th of March, June, September and December, showing proposed production and delivery schedules for preferred orders for military and other government purposes as well as non-preferred orders. WPB will establish production quotas for each manufacturer for preferred orders and in addition each manufacturer may use critical materials for other production to extent of 3% per quarter of the weight of materials processed during an average quarter of 1941. Delivery of equipment for other than preferred orders will be subject to approval on WPB-1319. Manufacturers will distribute equipment in their inventories through regular distribution channels when certificates of approval on WPB-1319 are submitted to them by dealers who in turn receive the certificates from their prospective customers. (L-267)

STEEL PIPE FITTINGS: The words "which were ordered" have been removed from definitions of pipe fittings which are excluded by reason of end use from the provisions of order L-278. This amendment removes the prerequisite of having firm orders on hand in order to exclude from WPB restrictions those pipe fittings for use on aircraft or watercraft —for conducting dangerous liquids or gases, and for replacement parts. (L-278)

PORTABLE CONVEYORS: Sub-base and supports for internal combustion engines and clutches, either attached or detached from the engine, now are excluded from restrictions on weight of metal specified in schedule A attached to the limitation order. (L-287)

ELECTRICAL DISTRIBUTION EQUIPMENT: Use of steel, copper, brass, etc. in the manufacture of secondary electrical distribution equipment is limited, effective Dec. 16, 1943. Included in the equipment covered are specified types of enclosed safety switches, enclosed branch and service circuit breakers, service entrance equipment, panel and distribution boards, and knife switches. Restrictions include in part: Reduction in gage of enclosing cases to save steel; ban on doors for panel boards of the dead-front type; prohibition on use of copper or brass in neutral terminal plates in devices rated 70 amperes or less and in other minor parts; ban on use of galvanized steel for enclosures. Equipment for direct use of the Army, Navy, Maritime Commission and War Shipping Administration (shipboard use only) and for direct use on aircraft is exempted. Purchase orders are limited to those with AA-5 or higher ratings, effective Sept. 26. (L-315)

M ORDERS

ZINC OXIDE: Shipment of one ton or more of lead-free zinc oxide is prohibited unless covered by preference rating. A limit on inventories of a 45-day current supply has been imposed on inventories. (M-11-a)

CHROMIUM CHEMICALS: Consumers of primary chromium chemicals now must report on form WPB-2954 (formerly PD-600) while suppliers must report on form WPB-2945 (formerly PD-601). Consumers are no longer required to report on form PD-54. These chemicals have been placed under allocation control but exemption from authorization is provided for acceptance of delivery in any month of not more than 100 pounds of any prime chromium chemical. A consumer or dealer must submit to each supplier a certificate as provided in M-18-b as amended in order to accept delivery without specific authorization in any month an aggregate quantity of primary chromium chemicals not exceeding the following: 4000 pounds of sodium bichromate or its equivalent in chromium tanning compounds, 500 pounds each of sodium chromate, potassium bichromate, potassium chromate and ammonium bichromate, and 800 pounds of chromic acid. (M-18-b)

RHODIUM: Provision requiring the filing of specific report forms has been eliminated from the rhodium conservation order. (M-95)

IRON AND STEEL: WPB approval must be obtained for use of gutters, spouting, conductor pipes and fittings in dwellings of two stories or less. Use of all kinds of steel now is permitted for siding for railroad, freight and passenger cars, street cars and busses and maintenance and repair. Use of any steel except bessemer-processed steel for all other purposes is prohibited. Production of pipe cleaners out of scrap wire is permitted. (M-126)

COMPONENT PART SCHEDULING: Provisions of the component scheduling procedure have been written into order M-293, as amended, and its operation has been placed on a mandatory basis. A new group of products has been designated as class Z and these products are affected only when the following items are programmed by the specified claimant agencies: (1) Ships as programmed by the Navy Department, Maritime commission and the War Department; (2) advanced and overseas bases as programmed by the Navy; (3) tanks, combat vehicles, and motor transport vehicles as programmed by the War Department; (4) power generating plants as programmed by the Office of War Utilities; (5) plants designed for the production of rubber as programmed by the Office of the Rubber Director; (6) plants designed for the production of high octane gasoline as programmed by the Petroleum Administration for War.

Any prime contractor or manufacturer must identify, when so instructed by claimant agency, his purchase orders for class Z products by filing a specified form. This form will identify the orders by program and by their use and will show shipping schedules in harmony with the schedule of the programmed end-product or project. No one other than a claimant agency may initiate the use of the form and then only in connection with orders for Z products for the above listed programs. The form may include a list of components of the products which are themselves class Z products. If it does, the manufacturer must in turn accompany them with a similar form when placing orders for any of these components. (M-293)

P ORDERS

REFRIGERATING AND AIR CONDITIONING SYSTEMS: Procedure for obtaining repair parts and materials for essential industrial and commercial refrigerating and air conditioning systems has been simplified. Provisions limiting the use of preference ratings to service agencies holding certificates of authority and serial numbers issued by WPB have been removed. Order P-126 now assigns preference ratings and CMP allotment symbol MRO to purchase orders for maintenance and repair parts and materials placed by any service agency, according to the uses of the systems for which they are needed. Systems and applicable preference ratings follow:

Class I: AA-1-MRO, for systems used in industrial food manufacturnig, processing, packaging, preservation, storage or transportation, or for purposes listed in schedule I of CMP regulations 5 and 5A;

Class II: AA-2-MRO, for systems used in restaurants, hotels or retail stores, exclusive of air conditioning systems; in milk cooling on farms; or purposes listed in schedule II of CMP regulations 5 and 5A; parts and materials needed to build up the service agency's inventory to the largest permitted amount;

Class III: AA-3-MRO, for systems (except air conditioning) used for purposes not listed in schedules I and II of CMP regulations 5 and 5A or in class II.

Controlled materials for class III uses may be bought only with special WPB permission; application is made on WPB-541 (formerly PD-1A). Controlled materials for repair and maintenance of class I and II systems may be bought with the preference ratings designated, with the exception of aluminum. This must be obtained in accordance with provisions of CMP regulations 5 and 5A.

A service agency may build up an inventory, estimated in dollar value, needed to continue emergency repair service for a 60-day period according to its current method and rate of operation. (P-126)

TRANSPORTATION OPERATING MATERIAL: Allotment symbol T-7 has been substituted for the previous symbol MRO-P-142 on purchase orders for materials entering into the operation of transportation systems. (P-142)

PRICE REGULATIONS

TIN: A new maximum price for Longborn 2 Star grade of tin, produced at Metals Reserve Co.'s Texas City smelter, has been established at 51.50c a pound, f.o.b. producer's plant. This grade has a minimum tin content of 99.5%.

Grade A tin, having a minimum tin content of 99.8% and meeting Treasury specifications as to maximum impurities, has a maximum price of 52.00c a pound, ex dock port of entry or f.o.b. producer's plant.

Maximum price for grade B tin now is established at 51.87½c a pound, ex dock port of entry or f.o.b. producer's plant or ½-cent above the previous ceiling price. This grade has a minimum tin content of 99.8% but not meeting other grade A specifications and must have an arsenic content not greater than 0.05%.

Maximum prices for other grades follow: Grade C, 99.65-99.79%, inclusive, and 99.8% purity or higher, not meeting specifications for grades A or B, 51.62½c; grade D, 99.5-99.64%, 51.50c; grade E, .99-99.49%, 51.12½c; and grade F, below 99% pure (for tin content), 51.00c.

Maximum prices for less than carload lots of 5 to 10 tons sold by MRC from inland warehouses are established at the base price plus the less-than-carload freight from New York to warehouse, less freight delivery allowances made by railroads to a customer who picks up his own fregiht at the terminal. (No. 17)

INDUSTRIAL MATERIALS: Sales of idle or frozen industrial materials to warehousemen, jobbers, and distributors now must be made under provisions of price regulation No. 204. Sales by producers of idle or frozen industrial materials remain exempt from the regulation. (No. 204)

Typewriter Output To Be Raised To Fill War Orders

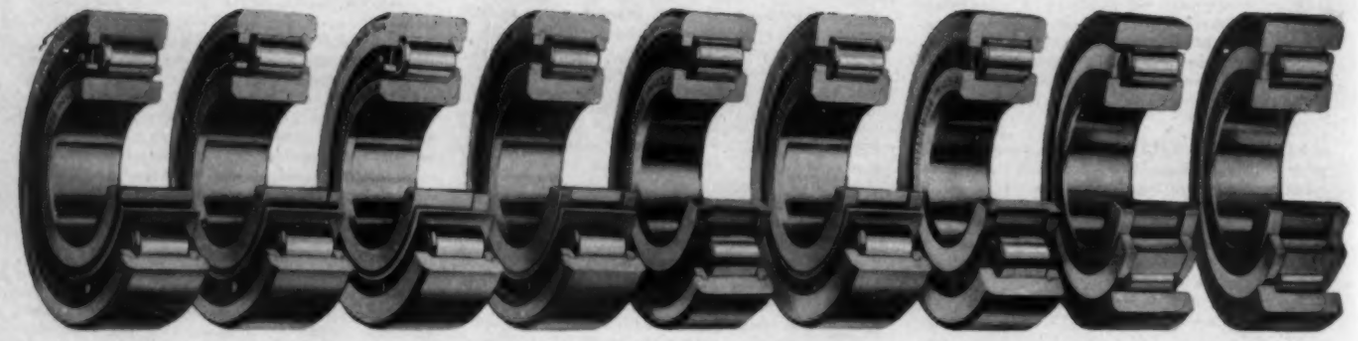
Authorization to industry to increase manufacture of typewriters to fill Army, Navy, Maritime Commission and other war orders will be issued shortly, the War Production Board has announced.

The manufacturing program covers the balance of 1943 and the first three months of 1944. Production will be stepped up from less than 1 per cent of normal to about 9 per cent. The machines will be principally telegraphic keyboard, wide carriage and other special varieties needed for specific uses by these agencies. None will be available for civilians.

WPB Issuing New Publication

Products and Priorities, a new publication designed to aid business men and government officials in obtaining information on all products, materials, and services handled by the War Production Board is being issued by WPB every four weeks. It includes all information formerly contained in *Priorities* and in *Product Assignments*, both of which have been discontinued.

HYATT HAS THE ANSWERS



A-TS R-TS R-YS U-TS U-TM U-YS U-YM BU-Z BU-L

TO ALL YOUR RADIAL BEARING PROBLEMS

...With 9 Different Types of Hy-Load Bearings.

In light and medium series, narrow and wide widths. Made to American Standards Association boundary dimensions—and to Hyatt standards of quality. The check list below shows how Hyatt Hy-Loads can solve radial bearing problems for you. For further information, write for Bulletin 541A.

A-TS For shafts of fixed location, carrying torsional and radial loads only.

R-TS Same as above, but with one flange on the inner race.

R-YS Where bearing is required to take light or intermittent thrust loads and locate the shaft in one direction. Has flange on inner and outer race.

U-TS Where application has no provision to retain the outer race endwise, or where bearing must be assembled as a unit.

U-TM For additional capacity on slow speed applications. Similar to U-TS, but separator is omitted to allow maximum number of rollers.

U-YS When bearing must be assembled as a complete unit, and sustain light thrust or locate shaft in one direction.

U-YM For additional capacity on slow speed applications. Similar to U-YS, but separator is omitted to allow maximum number of rollers.

BU-Z Where mounting conditions require that the roller and inner race assembly be kept with the shaft.

BU-L Where bearing must also locate the shaft or sustain light thrust loads in one direction.

HYATT ROLLER BEARINGS

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, N. J.

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

General Motors' war production expanded 44-fold in four years to $3,300,000,000 annually. Company uses 18,735 subcontractors and suppliers. Supervisory and engineering staff well maintained despite tremendous expansion

DETROIT

WHEN a young ordnance officer here remarked "unofficially" the other evening in conversation with friends that "this is rapidly becoming a General Motors' war" he perhaps unwittingly put his finger on a fact which is daily becoming more striking—the enormous share of war production which GM has shouldered. Certain corollary facts likewise are pertinent: The facility with which GM tackles new jobs; the managerial skill which it seems able to muster to handle new tasks without serious detriment to present undertakings; the high regard which virtually all service procurement agencies and men have for the corporation; the top-notch position it holds in Washington councils.

Take a quick squint at some highlights in current GM war production. The corporation's war job is being carried out in 107 plants in 46 U. S. cities with 77,000,000 square feet of floor space; in five plants in Canada, as well as in several other plants throughout the world. Production now encompasses 2000 separate items, ranging from ball bearings to tanks, and is pouring out at a rate of about $10,000,000 worth a day.

Here is the rate at which GM war production has been accelerated:

1940	$ 75,000,000
1941	506,000,000
1942	1,900,000,000
1943	3,300,000,000*

*Rate indicated by second quarter operations.

Meanwhile, employment has skyrocketed from 233,000 in 1929, to 304,000 in 1941, to 314,000 in 1942, and 426,000 currently.

Financialwise, the story is the reverse:

	Profits per share	Dividends
1941	$4.44	$3.75
1942	2.84*	2.00
1943 (first half)	1.49	1.00

*Excluding special income of 71 cents a share.

The vast volume of business handled by GM plants is subcontracted through 18,735 different vendors and suppliers, one group of which breaks down into 43 per cent employing less than 100 persons, 31 per cent employing 100-500, and 26 per cent more than 500.

This may sound like beating the drum for General Motors, and in fact it is, because even in its public relations policies the corporation proves exceptionally adept at getting its story across effectively and without too much braggadocio. It has far outdistanced its principal automotive competitors, Ford and Chrysler, in this respect, a development which unfortunately reflects in the public eye on the extent of the war production job these companies are doing, which incidentally is no little accomplishment. But these days, when public relations activity is a key factor in the actual operation of the government itself, the successful industry must gear itself accordingly.

Ford, at the moment, has virtually no public relations policy or staff. It is extremely difficult to obtain any news or data on what the company is doing in the war effort. To a lesser degree, the public relations effort of Chrysler Corp. is a negative sort of thing, certainly well behind the aggressive policy of GM.

Cites Capable Management

It is a mystery to many how General Motors has been able to effect its pronounced wartime expansion and still keep its various divisions apparently capably staffed with supervisory personnel. There seems to have been fewer changes in the old automotive purchasing and engineering contacts at General Motors plants than in any other automotive company. Virtually all suppliers and vendors will attest to this. What it must add up to is capable direction from the top of the organization, and for this GM merits the highest praise.

Latest report circulated around Detroit, though unconfirmed by the corporation, is that the Navy Department shortly will ask GM to assume management of the Hudson Naval Arsenal, a sprawling collegiate-appearing assortment of structures built here a couple of years ago on the northeastern outskirts of Detroit. Far removed from the main headquarters of Hudson Motor Car Co., it has nevertheless been staffed by Hudson personnel and has been operating regularly for some time, though little is known of the actual production job beyond the fact that Oerlikon guns are produced along with a variety of other special naval ordnance jobs.

The General Motors war staff denies any knowledge of an impending change at the naval arsenal, but the usual "authoritative sources" here say that a deal is now on the fire in Washington which will transfer supervision of the plant.

Further significant changes in the executive personnel have been made at Ford Motor Co., which are greeted with the usual silence on the part of company spokesmen. Lawrence S. Sheldrick, one-time head chassis engineer for Ford and until recently active in the direction of other engineering jobs such as the tank engine, the Sperry director, etc., has resigned and at the moment is on a fishing trip which makes his future plans obscure.

As is the case with nearly all Ford officials, Mr. Sheldrick had no title but had been with the company since 1922 when Ford purchased Lincoln Motor. He played a major part in the change-over from the Model T to Model A development of the Ford 6-cylinder engine, and the amphibian jeep for the Army. Prior to his association with Lincoln he had served in an engineering capacity for Hudson, Continental Motors, Timken-Detroit Axle and the Parrett Tractor Co. in Chicago. He is succeeded at Ford by his former assistant in charge

ACK-ACK BREECH CASINGS: Workers are putting finishing touches on finely machined breech casing for Bofors antiaircraft guns in a DeSoto Division plant of Chrysler Corp.

of truck engineering, Dale Roeder, and J. J. Wharam, hitherto in charge of Lincoln chassis engineering.

Departure of Sheldrick leaves a distinct gap in the Ford engineering ranks. Why he resigned has not been made public, but trade circles are exchanging a story which purports to be true. It runs to the effect that Mr. Sheldrick was showing Mr. Henry Ford II, recently released from the services and now being groomed for purchasing department activity at the Rouge, around the plant, and came upon some experimental chassis which they inspected in detail. All of them carried the conventional Ford transverse springs and the two men commented at length on the designs. Later, so the story runs, the younger Ford happened to be discussing the matter with Mr. Henry Ford and the latter asked his grandson who had shown him the experimental bodies. When informed that it was Mr. Sheldrick, nothing more was said, but shortly thereafter the engineer was "relieved of his responsibilities."

This is a typical Ford story, almost too typical to be true. Legends of how various ex-officials at Ford came to the parting of the ways are innumerable, and some are based on even less consequential incidents than the one related above. The fact remains, however, that the men left, just as Mr. Sheldrick has now left.

Concurrently with the departure of Sheldrick, C. W. Van Ranst, another top Ford engineer, has resigned and is now associated with F. L. Jacobs Co. here, on the development of a new "postwar" engine. The Jacobs company is a parts supplier, producing such items as glass channels, visors, instrument panels, spring covers and seating equipment in the normal automotive times. Tieup of an engine development with this interest is regarded by many as a strange occurrence.

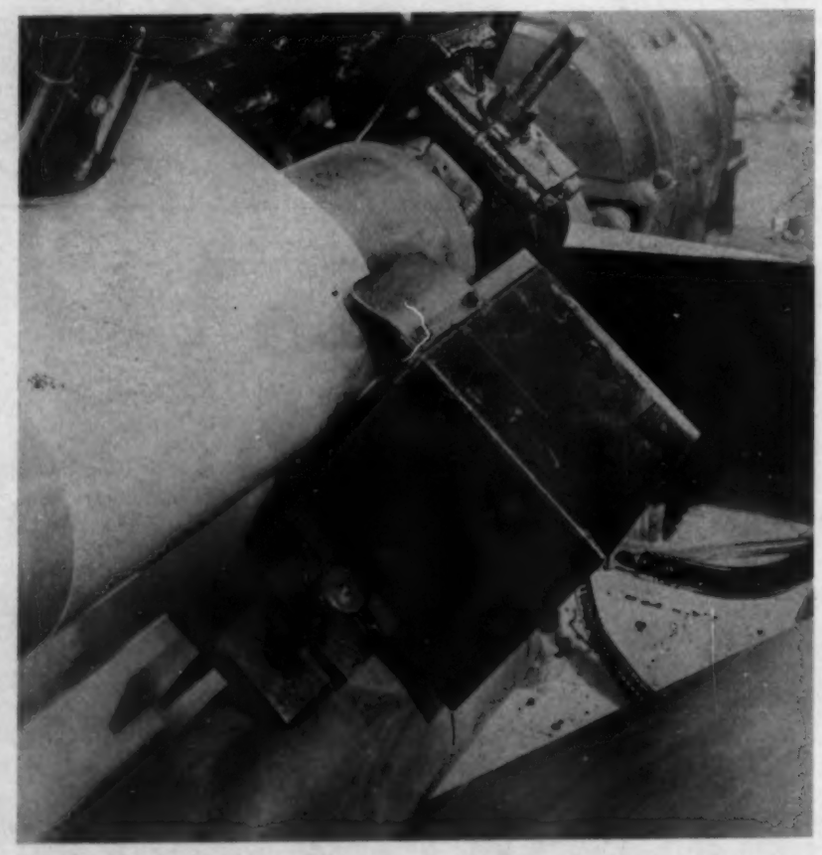
Van Ranst Left Sept. 1

Van Ranst has been close to Sheldrick in Ford, having been brought in three years ago to supervise development of the Ford 12-cylinder aircraft engine, later revised to an 8-cylinder engine for combat tanks and now being built at the Lincoln plant. Prior to this he was associated with Packard for seven years, and before that with Cord in Auburn, Ind. His departure from Ford may go hand in hand with Sheldrick's resignation, but they did not occur simultaneously, Van Ranst leaving Sept. 1. Inquiry at the Ford plant last week could not even confirm the fact that he had left.

Another Ford resignation, which has been announced officially, is that of E. T. Gregorie, 35-year old director of design and styling who originated the Lincoln Continental model, the small German Taunus Ford model and the English Ford model brought out in 1932. Both German and English models were 4-cylinder jobs, the former developing 32-horsepower and being mounted in a 1750-pound two-door sedan, the latter a 22-horsepower unit. They have been touted as typifying what some Ford executives would like to see produced in the U. S. The old idea of a small package with high value, produced in the millions for the mass market, has been a basic belief of Mr. Ford and probably still is. His view was not shared by others in the organization, including the late Edsel Ford, and it is possible the recent personnel upheavals in the organization following the death of Edsel could be traced to conflicting views on basic policy in the automotive field.

Latest check on average weekly wages in the automotive industry reveals the figure has risen to $58.47. Adjusted in terms of "real" earnings, the average weekly paycheck is worth $46.19 in terms of goods and services the prewar dollar could buy. Both figures represent a peak in the history of the industry. Much of the increase is ascribed to a longer work week, with accompanying premium overtime payments. On the other hand, however, hourly rates have expanded by 19 per cent since September, 1939, rising from an average of 92 cents an hour to the current hourly rate of $1.10.

If productivity per man-hour of labor had increased at the same rate as the wage level, the present manpower shortage would not be nearly as acute as it is painted today. This is one of the principal stumbling blocks in plant operations—how to spur workmen on to performing a real day's work. Certainly a labor draft is not the answer; this would only make matters worse. Difficult as it is now to receive a day's work for a day's pay, the herding of labor forces around like sheep would just accentuate the decline in productivity.

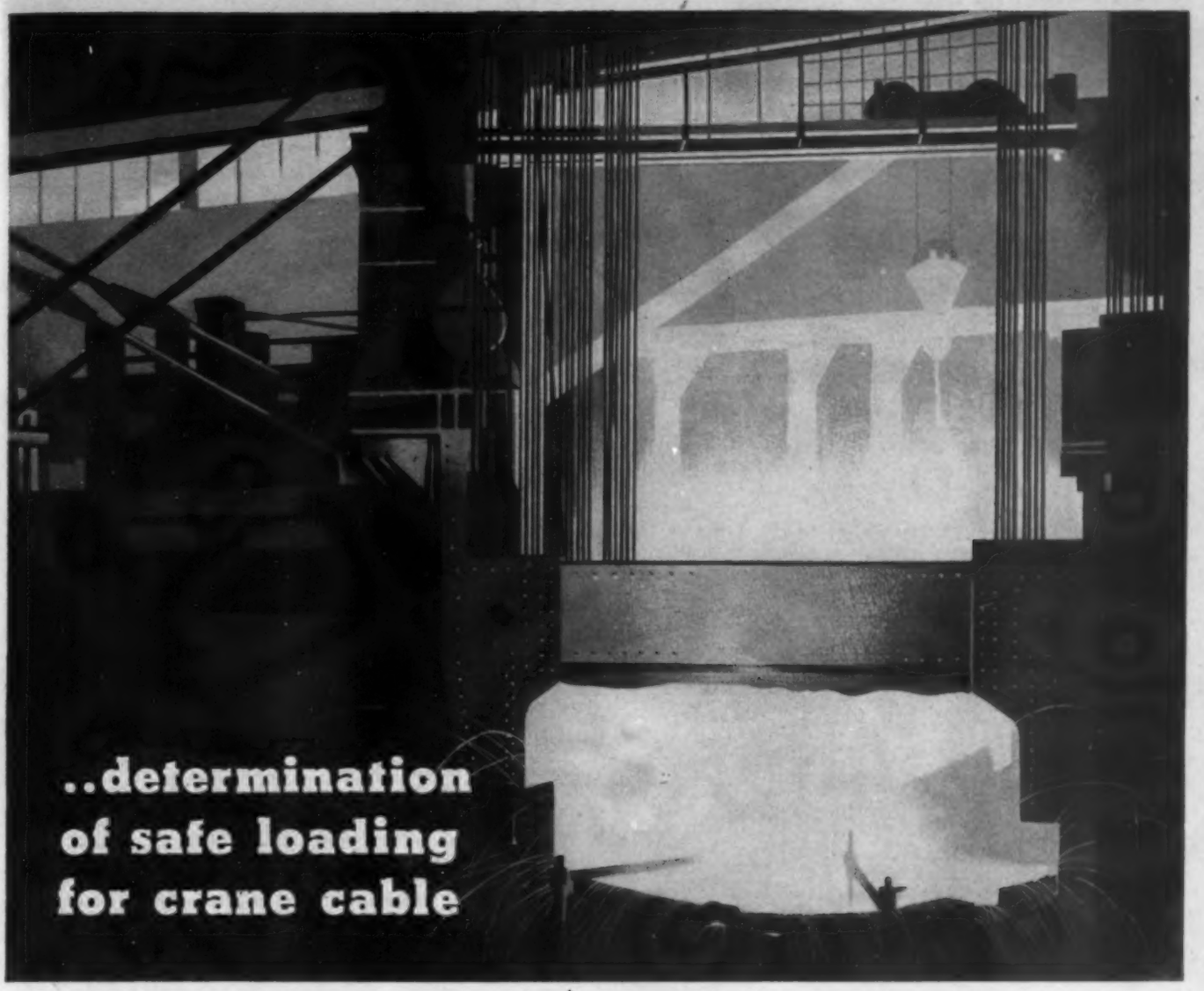


ELECTRONICS AT WORK: This side register control, made by General Electric Co., holds accurate edge alignment for uniform coiling of strip steel. The device, one of many developed by General Electric to control industrial equipment, prevents variations of even a few thousandths of an inch in the position of the strip.

Nelson-Lyttelton Discuss Production in London

Production of war plants in the United States and England is expected to be more closely co-ordinated as a result of the arrival in London of Donald M. Nelson, chairman, War Production Board.

Mr. Nelson's visit repays ostensibly the two visits made to this country by Capt. Oliver Lyttelton, Great Britain's Minister of Production. Italian needs are being studied by Mr. Nelson. Plans are reportedly under way to supply Italy with locomotives, power plants, water systems, and other facilities which have been destroyed by air raids and the present battles which are raging on Italian soil.



Information supplied by an Industrial Publication

Many of the loads a crane is required to lift either equal or approximate the rated lifting power of the crane. This places a very severe strain on the cables, and, under constant usage, they are liable to lose elasticity and acquire a permanent set, after which breakage can easily occur.

The following precautions at the time a new steel cable is installed will help prevent accidental breakage later on. The diameter of the cable without load is measured with a micrometer. A similar reading is then taken after two or three lifts and the new diameter recorded. The cable will have stretched and the diameter will be slightly less than the original.

With these two readings recorded, a safety procedure is set up. At stated intervals thereafter the cable diameter is "miked," and the cable is considered in good condition, and kept in service, only if the diameter does not drop below the lower of original recorded readings. Usually 3/32" is considered the maximum reduction allowable in the diameter of steel crane cables.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

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MOLY

WING TIPS

Boeing opens new branch plants to alleviate manpower problem. More than 40 per cent of Fortress parts supplied by subcontractors. . . Cementing process dubbed "cycle welding". . . Fighter plane "box score" 13½ to 1

BOEING AIRCRAFT CO. announces that 20 per cent of the work now being done in the main Flying Fortress plant at Seattle will be moved to Boeing branch plants which are being placed in operation throughout western Washington.

At the same time it is disclosed that more than 40 per cent of the work of building the Fortress is already being handled by subcontracting. One hundred fifty-seven major subcontractors, located throughout the nation, ship parts to Seattle for installation.

Company's branch plant program, expanded far beyond original plans because of the local manpower problems, calls for satellite factories in Aberdeen, Everett, Bellingham and Tacoma, in addition to several other western Washington cities yet to be announced.

Operations have started in Aberdeen, first of the branch plants, and work is being rushed at the other plants in order to put them into actual production as soon as possible.

"With a critical shortage of manpower in this area," states R. A. Neale, Boeing operations manager, "we are completely revising our production operation to transfer all possible assemblies to branch plants in out-of-town locations. In addition, we are placing further subcontracts in the Seattle area with those plants having facilities and personnel suitable for this type of work."

In addition to the 157 major subcontractors, located in 20 different states, more than 1500 direct vendors and suppliers provide 10,473 separate parts for the Boeing Flying Fortress.

A recent study reveals subcontractors with plants employing less than 500 persons contribute 74.5 per cent of the parts which the company subcontracts. This, it was stated, means that many small plants, whose operations would otherwise have been disrupted by the war emergency, are kept operating at full capacity and their workers are given an opportunity to play a definite part in the war effort.

Among the major items subcontracted are exhaust system, nacelles, nose assembly, ailerons, landing gear assembly, fuel tanks, outboard wing assemblies, oil tanks, bomb bay doors, seats, fins, rudder, inboard wing ribs, stabilizer, cowling, elevators, inboard wing spars, fuel tank wing doors, wing flaps, floors and many smaller parts, ranging from gussets, special eyebolts and hinges, to shims, decals and thermocouple leads.

Use Specially Prepared Cement

First officially-approved information on the "cycleweld" method of joining structures has come from S. G. Saunders, production research engineer, Chrysler Corp., Detroit, who in co-operation with the Army Air Forces, the Navy Bureau of Aeronautics and Goodyear Tire & Rubber Co., has directed development of the process since its inception several years ago.

Cyclewelding (no welding is involved since the term is generally held to connote fusion of the base metal) is achieved by applying a specially prepared cement on the surfaces to be connected and then applying heat and pressure to the joint. The cement, produced by Goodyear, can be brushed on or made in the form of tape and laid on. The process can be used to join metal to metal, metal to wood, metal to rubber and metal to plastic, all preferably in thin gages, yielding joints which the sponsors of the process claim show high strength, are easy to form and inexpensive.

Composition of the cement is not revealed, nor are specific details of the process. The cement doubtless embodies a thermosetting plastic material, of which there are many on the market.

Chrysler already is in production on cyclewelded wing flaps for fighter planes, ski pedestals for gliders, essential structural sections for medium bombers, fiber and wood gasoline tanks and many small aircraft parts. Experiments are being conducted on completely cycle-welded airplanes and gliders.

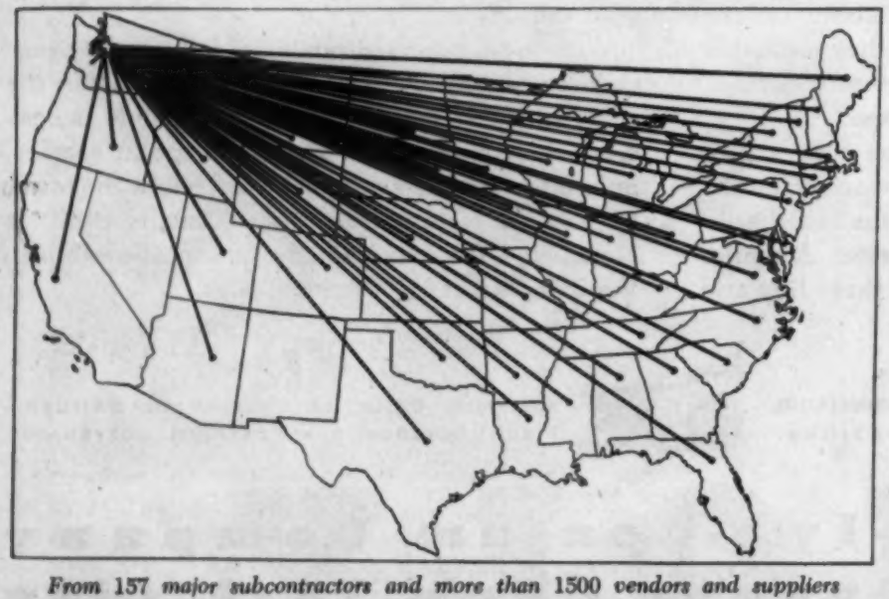
The principle of cyclewelding is a peacetime development, emerging from the early use of adhesive cement for attachment of interior insulation material to automobile roofs. In 1940, engineers had so improved the cement that it was extended to other parts—panes of glass, trunk covers, cowling ventilators and parts of fenders. Early in 1941 the corporation began work with the Army Air Forces in applying the method to aircraft parts and after preliminary development work the strength of joints was stepped up better than 100 per cent. On Aug. 12, 1941, arrangements were made with Goodyear for supplying the cement, and since that time further experimentation has increased strength of the cement another 25 per cent. The process was first described publicly to 200 representatives of the aircraft industry on Oct. 15, 1942, by Chrysler officials and army and navy officers.

Cyclewelding has been accepted by both the army and navy air arms for structural and nonstructural parts of aircraft providing they lend themselves to this type of cement.

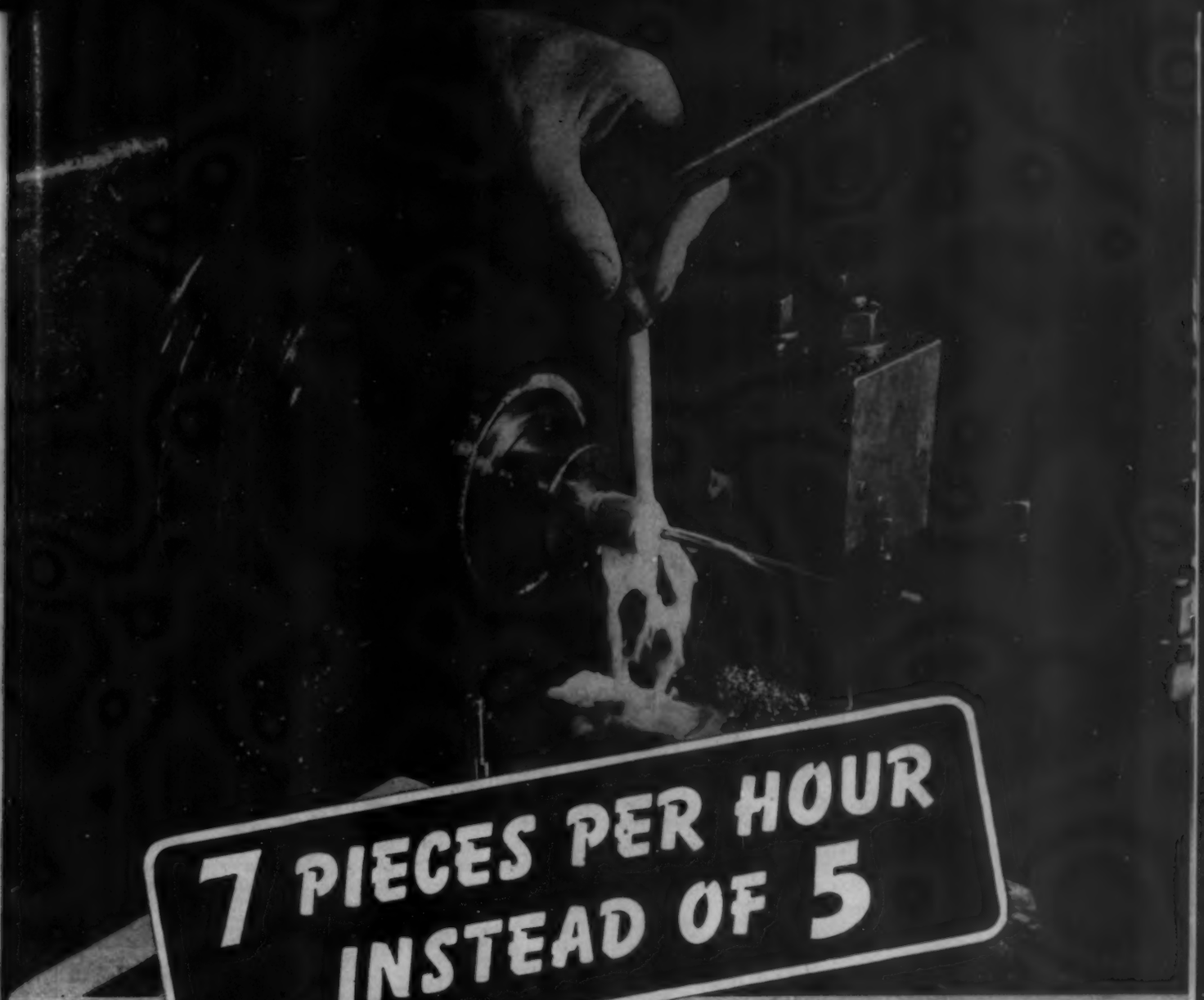
Shows High Strength

Lest anyone get the erroneous idea that this is a revolutionary new process designed to displace completely current riveting and welding methods, it should be pointed out this is not the case. A cemented joint, in thin materials, by its nature, shows high strength, because full use is made of the entire contact area of the joint in absorbing load. Thus, if a cement having adhesive power or shear strength of, say, 3000 pounds per square inch is available, then a joint with relatively small area will withstand a load well beyond that which a riveted or spot welded joint will support, because in the latter, the total area of rivets or weld spots is relatively small, despite the greater shear and tensile strengths of rivets and welds over cement.

Cyclewelding as yet has barely scratched the surface in actual applications, but its potentialities in aircraft, and in many postwar consumer goods,



From 157 major subcontractors and more than 1500 vendors and suppliers in 46 states, parts of the Boeing Flying Fortress flow to Seattle. The subcontractors supply 10,473 separate parts



SUNOCO EMULSIFYING CUTTING OIL

...boosts cutting tool life 40%...speeds production...improves finish

Here's one plant where vital parts for war machines are being produced in almost half the time it used to take . . . thanks to Sunoco Emulsifying Cutting Oil.

According to reports slow speeds were necessary because of excessive heating and smoking. Tools wore rapidly. Cutting oil costs were high. Then a Sun Doctor of Industry was called in. At his suggestion a switch was made to Sunoco. In one week, results were remarkable. With Sunoco's high heat-absorbing and lubricating qualities, speeds were increased. Seven parts were produced each hour instead of the former five . . . making possible 16 "extras" per day with no increase in tool grinding. Finishes were noticeably finer. And all at a saving of 10% in cutting oil cost.

This is only one of many cases where Sunoco Emulsifying Cutting Oil is speeding the production pace of American industry in its race with War. Probably a similar speed-up can be accomplished in your plant. Call in a Sun Oil Company Engineer—write or phone your local Sun office.

SUN OIL COMPANY, *Philadelphia*

Sun Oil Company, Limited . . . Toronto, Canada

SUNOCO

SUN INDUSTRIAL PRODUCTS *HELPING INDUSTRY HELP AMERICA*

appear bright for supplementing and complementing conventional types of joints.

The world's largest four-bladed propeller, a hollow steel blade electric controllable type built by Curtiss-Wright Corp. and designed for use on giant multi-engined dreadnaughts of the skies, has been placed on public display at the Army Air Forces' special aircraft exhibit currently being held in the New York Museum of Science and Industry.

The propeller measures 16 feet 8 inches in diameter and weighs close to 800 pounds. Especially designed by the organization for use on large planes of the future, the huge "prop" embodies such highly important features as constant speed, controllable pitch and the Curtiss-developed full feathering control which greatly increases the efficiency of modern high-powered warplanes.

Increased evidence that the Allied air forces are whittling down the Axis warplane machine at a greater rate than ever before, is strongly supported in a recently compiled "box score" released by Curtiss-Wright Corp., New York, which shows that Curtiss P-40 fighters have taken a 13½ to 1 toll of the enemy. The box score, announced by B. S. Wright, vice president of the organization in charge of its warplane manufacturing, compiles figures obtained from authoritative sources based on 50 recent aerial engagements in which 457 P-40 fighters met 1257 Axis aircraft of all types on every global war front.

In compiling this battle score, which is only a portion of the four-year total combat record of these fighter planes active against the enemy since the American Volunteer Group's "Flying Tigers" accomplishments over Burma and China, no consideration was given to reports of enemy planes "probably" destroyed. Some of the estimates show the P-40 as a winner with a margin of 18 to 1 victories.

GM Cleveland Plant Producing Fighter Planes

General Motors Corp.'s Fisher Aircraft plant at the Cleveland Airport, originally designed to produce large bombers, is now producing fighter planes of an unannounced design, the Army Air Force reported recently.

A large number of employes are being given additional training because of the switch from bomber to fighter production. Equipment set up in the large plant for bomber production has been removed to other airplane plants and is already in use, officials said.

SWPC Sets Up Regional Technical Advisory Service

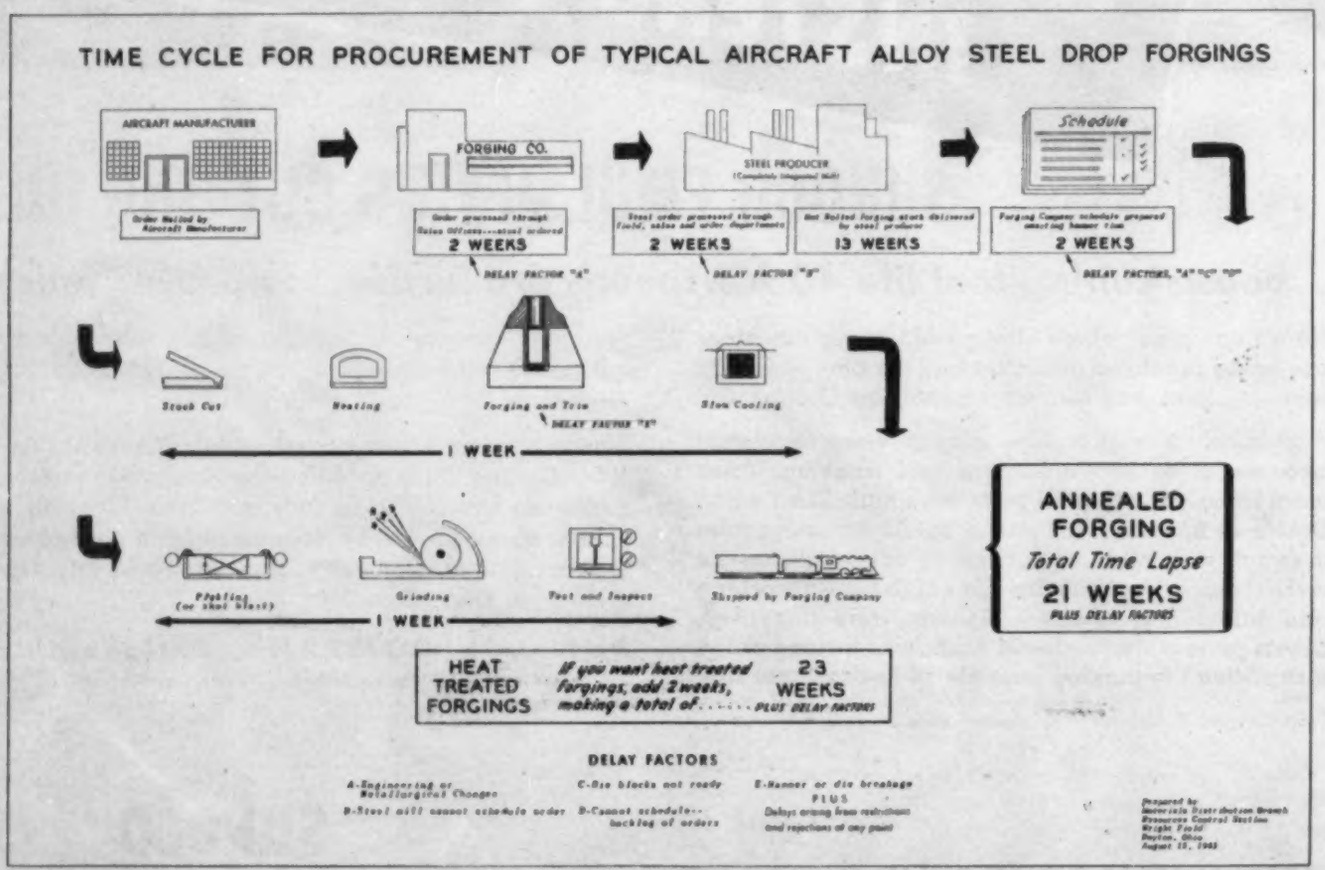
Smaller War Plants Corp. has established a technical advisory service to serve the interests of small plants, it was announced last week by Brig. Gen. Robert W. Johnson, chairman.

The service, available through regional offices, will put at the disposal of the small manufacturer, who requires technical research in the solution of a production problem, information drawn from governmental agencies, trade associations, technical and scientific organizations, technical magazine editors, and the research laboratories of educational institutions and private industry.

This is the first time that small plants have been given the opportunity to obtain technical information through one central government agency and it is expected to be of tremendous assistance to small manufacturers in rounding out their production capabilities. The technical advisory service began from an idea which has been applied successfully in private business since 1937 by Bert H. White, vice president of the Liberty bank of Buffalo, now on leave to serve as a major in the Army Air Forces, from whom he was borrowed by SWPC to set up this service.

The list of typical inquiries is obviously manifold but random examples include technical information on how to overcome porosity in castings, how to prevent sewing machine needles from overheating, how to find a market for scrap rayon, where to find a special adhesive to cement heavy fabric to metal, and a variety of questions regarding developments in wood, metallurgy, plastics and electronics.

The service itself does not engage in industrial research or testing, but it enjoys the voluntary and helpful co-operation of the various governmental agencies, as well as that of an unlimited number of research laboratories, including those of universities, private institutions and industry.



• The modern Hobart Multi-Range Dial is a feature that quickly gives you over 1,000 combinations of welding current without a single dead spot. It's simple to select any one of ten desired ranges on the large wheel, then select one of a hundred points within that range on the small dial. An invaluable feature for perfect welds.

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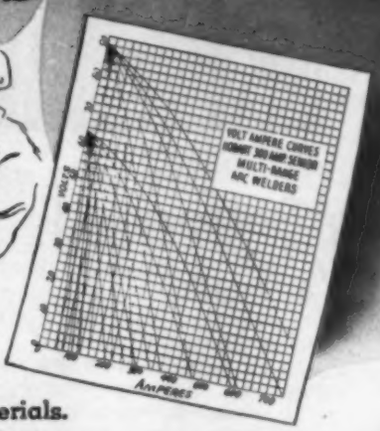

Welding today is an important part in all phases of metal fabrication —it is a big factor in reducing weight, increasing strength, or converting to new materials. Hobart Arc Welders with their many outstanding features give more quality welds per hour. Use the coupon for details.

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Worthington women work well in tough grinding jobs too

This girl (above, right) can really "spot 'em"

Tough Tasks Being Performed Satisfactorily by Women

By W. W. KEMPHERT
Manager
Standard Products Division
Worthington Pump & Machinery Corp.
Harrison, N. J.

WOMEN are replacing men in a wide variety of industrial occupations as the manpower shortage becomes increasingly acute. By the end of this year it is estimated that 3 out of every 10 industrial workers will be women to whom industry now is looking to perform countless tasks hitherto thought only possible of performance by men.

The record of women in industry in many of these unfamiliar jobs is highly encouraging. As for adaptability, women workers have patience, perseverance, and have more nimble fingers than men. They are quick and accurate on "fingertwiddling" work. They are not too easily bored by a repetitive operation, and are endowed with a persistence not common to male workers.

Indicative of what women are doing is their record at the plants of the Worthington Pump & Machinery Corp. in Harrison, N. J., Holyoke, Mass., and Buffalo.

Worthington is primarily in the heavy machinery business with a long list of diversified products, thus eliminating the possibility of quantity production to any great extent and making it difficult to break down basic functions into simple repetitive operations.

Worthington's type of overall business does not support an assembly line. An assembler must learn to assemble everything and a mechanic must be an all-around man.

In spite of this setup built around heavy, massive equipment, places have been found for women in several departments. In the storeroom where items weigh under 25 pounds, women are being used. Also, considerable success has been encountered in using them as shop clerks and inspectors. They also are performing operations in the small tool grinding division. In the foundry women are used as coremakers.

In the machine shop, women serve as store-room and stock-room attendants, production expediters, time checkers and other shop clerical work, small standard parts assemblers, inspectors, elevator operators, crane operators, engine and compressor testers, electric mule operators, helpers on radial drills and as machine tool operators on surface and internal grinders, radial drills, smaller drills, small turret lathes, and milling machines.

Inspecting small machined parts is easy for this woman worker in Worthington's Harrison, N. J., plant

Women are found particularly adaptable for machine work on small parts and also as arc welders. It has been observed that a woman can become a skilled machine operator on repetitive work on a quantity production basis as readily as an untrained man.

In the engineering department women now are employed as draftsmen and in the company's application engineering

department as estimators. The latter usually are college trained girls.

Physical examinations are made by a physician and a female registered nurse. Worthington is anxious about the safety of its women and insists that each equip herself with a slack and jacket outfit of the company's general specifications with head covering to completely cover the hair and with safety shoes with rigid toes (not steel) capable of withstanding anything that a woman can lift.

Preliminary training includes job instruction through foremen, assistant foremen and special instructors who have had job instructor training. Class room sessions are held on blueprint reading, shop arithmetic, use of scales, gages, etc. Production training is right on the job itself and conducted through foremen, leadmen and operators.

Women work-hours are such as to comply with all state regulations. Rest rooms are under the direction of a matron.

Prior to Pearl Harbor, Worthington employed no women but now has well over 400 at its several plants. In the Harrison, N. J. plant, 180 or 5 per cent of the 3700 workers employed are women. At Holyoke, Mass. 160 or 6.5 per cent of 2485 workers are women, and at Buffalo the proportion is 100 or 7 per cent of 1400.

Canada Launches 200th 10,000-Ton Cargo Ship

With the launching of the two hundredth Canadian 10,000-ton cargo ship last month, Canadian shipyards had to their credit the building within two years of a fleet of cargo vessels equal to 10 per cent of the total merchant tonnage of Great Britain at the beginning of the war. In 23 major shipyards, 65 smaller boatyards and in the large component industry supplying their requirements are employed some 100,000 persons. More than 600 ships have been sent down Canadian ways since the outbreak of war—merchant vessels, frigates, corvettes, mine-sweepers, and patrol vessels. Overall commitments for shipbuilding in Canada total $1,000,000,000 of which about one half is earmarked for cargo ships; more than $15,000,000 for small boats; $15,000,000 for ship repair and overhaul and the balance for escort and fighting ships.

Under the aircraft production program more than 9000 planes have been delivered. Employed in Canadian aircraft industry and component factories there are now 100,000 workers, more than a quarter of them women, who are building nine types of aircraft, four trainers, four service planes and one transport. In addition there has been created a giant overhaul industry to repair the thousands of planes.

From the Canadian automotive industry is flowing more than 100 types of vehicles. The war production passed the 500,000 mark this summer. The vehicles from these plants now are in action in every theatre of war.

Consumer Buying Spree Forecast

Survey shows expenditures for consumer goods by the nation's families when war ends will far exceed the billions indicated last winter

POSTWAR buying intentions of the nation's families are increasing. Indications are postwar purchases will far exceed the billions of dollars that were in prospect last winter, up-to-the-minute nationwide survey by the Chamber of Commerce of the United States indicates.

For example, the number of families planning to purchase one or more major articles within six months after the return of peace has risen from 53 per cent to 64 per cent of the nation's total. Sixty-one per cent of the people interviewed say they now are able to save, against 56 per cent eight months ago. Actually, 84 per cent, an increase of 3 percentage points, are accumulating money in some form.

The public generally believes a little more firmly that the first year after the end of the war will be one of prosperity; that there will be less unemployment than they believed probable eight months ago.

The Chamber's survey shows these major changes in trends:

About 3,675,000 families, compared to 2,590,000 in December, now intend to buy automobiles to cost $3,307,500,000, compared with $2,331,000,000.

The household appliance field shows the greatest increase in buying intentions from $860,185,000 to $1,215,910,000, with greatest jump in radios and electric kitchen mixers. About 2,625,000 intend to buy mechanical refrigerators, 2,100,000 intend to buy washing machines, 1,645,000 intend to buy stoves; 1,400,000 will buy vacuum cleaners, 2,555,000 will buy radios, 840,000 want sewing machines, 1,505,000 will buy electric irons and 1,085,000 intend to buy electric kitchen mixers.

Overall home furnishings purchase intentions show only a nominal increase from $709,905,000 to $711,410,000.

About 1,540,000—increase of 50 per cent—intend to build or buy a new home within six months after the war is over. Prospective investment has risen from an estimated $5,000,000,000 to $7,184,800,000.

Seventy-two per cent of the people say they feel they are at least as well off financially as a year ago, a drop of 1 per cent. The figures, broken down, show the following percentages for the two surveys: East, 65 per cent and 69 per cent; Middlewest, 74 per cent and 72 per cent; South 79 per cent and 78 per cent; Far West, 70 per cent and 78 per cent.

The survey shows the percentage of people buying war bonds and stamps has risen from 69 to 76. Life insurance investments are attracting the funds of 56 per cent of the people, compared with 58 per cent in December. The percentage going to savings accounts has risen from 21 per cent to 26 per cent. But only 25 per cent of the nation's families are saving for a specific purpose, 6 points higher than eight months ago.

Says Postwar Auto Will Be Better but Not Fantastic

Fantastic dreams of tear-drop, rear-engine cars made of "super" materials with curved glass tops and plastic bodies, belong to the next decade, in the opinion of Delmar G. Roos, vice president in charge of engineering, Willys-Overland Motors, Toledo, O., who predicts that America's postwar automobiles will be lighter, easier to handle, better riding and cheaper to operate.

Roos cites these points as an "engineer's approach" to postwar automobile design: (1) There will be a demand for more efficient vehicles at lower initial cost. This will mean lighter cars, but not necessarily smaller ones; lighter and smaller engines developing greater power per cubic inch. (2) Since automotive progress has always been the result of "evolution and not revolution", radical changes will be slow in coming. (3) During the war auto manufacturers have had little time or facilities to design, build or test the "dream world" cars and are not willing to gamble their reputation on "futuristic" models which can't meet the hard test of public use. (4) Plastic bodies and curved glass surfaces, in their present form, are unsatisfactory; the bodies have none of the advantages of steel. (5) The industry's experiments before the war to produce a flawless automatic transmission should bear fruit in the postwar period.

Heavier Power Demands Seen in Postwar Period

American homes and industries in the postwar era will make increasingly heavy demands on the country's electric generating capacity, Samuel G. Hibben, director of applied lighting, Westinghouse Lamp Division, Bloomfield, N. J., declared recently addressing a meeting of the Municipal Electric Utilities Association of New York state.

Mr. Hibben cited radiant heat lamps for home heating as one example of the probable new demands to be made upon the nation's electric power resources. He said radiant heat lamps may be widely used in homes to replace the more conventional types of light.

MEN of INDUSTRY

ROBERT G. GLASS

Who has been elected a director and vice president and manager of operations of the Geneva Steel Co., Geneva, Utah, reported in STEEL, Sept. 20, page 106.

FRED W. PENNINGTON

Who has been appointed manager of publications and advertising, Kennametal Inc., Latrobe, Pa., noted in STEEL, Aug. 23, p. 85.

C. W. HASELTINE

Who has been named vice president, Mack Trucks Inc., Long Island City, N. Y., as announced in STEEL, Sept. 20, page 106.

Frederick H. Bucholz has been elected president of the Omaha Steel Works, Omaha, Neb., filling the vacancy created by the death of John W. Towle. **Karl E. Vogel,** formerly second vice president and general manager, has been elected executive vice president, and **Paul H. Leussler** has been named a director and second vice president.

—o—

C. D. Barnhart has been elected chairman of the board, W. S. Rockwell Co., New York. Other officers recently elected are: **C. B. Kentnor Jr.,** president; **J. A. Doyle,** vice president; **H. J. N. Voltman,** secretary; and **G. A. Yagle,** treasurer.

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Cornelius Francis Kelley, chairman of the board, Anaconda Copper Mining Co., New York, has received the Charles F. Rand memorial medal for "distinguished achievement in mining administration," awarded by the American Institute of Mining and Metallurgical Engineers Sept. 18.

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John J. Ryan, counsel for Republic Aviation Corp., Farmingdale, N. Y., has been elected a vice president of the corporation. Mr. Ryan joined Republic Aviation in 1941.

—o—

A. N. Morton has been appointed vice president and director of Mack Mfg. Corp., Long Island City, N. Y. Mr. Morton was named factory manager of the corporation's plant in Plainfield, N. J. in 1941 and in February of this year he became production manager of Mack's factory holdings in Plainfield and New Brunswick, N. J., and Allentown, Pa., a position he will retain.

—o—

Philip P. Brown has been elected vice president in charge of the Midwest division, Reliance Steel Corp., Cleveland. Mr. Brown has been associated with Reliance Steel Corp. since its incorporation in 1937, and prior to that time he was with the original affiliated companies which were the predecessors of the present corporation.

—o—

M. J. Graham has been appointed manager of manufacturing, International Harvester Co., Chicago, and will be in direct operating charge of all American and Canadian manufacturing of the company. Mr. Graham, a veteran of nearly 37 years with Harvester, has been works manager in charge of the motor truck group of Harvester plants for the past three years.

—o—

Clyde C. Kinsley has been named production manager, Sioux Steel Co., Sioux Falls, S. D. Mr. Kinsley has been associated with the district WPB office and prior to the war was with the Dakota Pipe & Culvert Co. for 14 years.

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Thomas A. Wright has been elected president, Lucius Pitkin Inc., New York. Other recently elected officers of this research organization are: **John Jicha,** vice president and chemical director, and **Dr. Robert H. Bell,** vice president and research director.

—o—

R. W. Morrison, manager of the Industrial Pneumatic Tool division, Aro Equipment Corp., Bryan, O., has been appointed a member of the Portable Pneumatic Tool Industry Advisory Committee, War Production Board, Washington.

—o—

Fred H. Currie has been appointed manager of sales for the Pacific Coast, Copperweld Steel Co., Warren, O. Mr. Currie, who was formerly affiliated with Timken Steel & Tube division, Timken Roller Bearing Co., Canton, O., will handle the sales of all the products of Copperweld's Warren Steel division and will have his offices at 403 West Eighth street, Los Angeles.

—o—

Lawrence B. Jackson has been appointed director of engineering, Diesel division, American Locomotive Co., New York. Mr. Jackson, who has been associated with Fairbanks Morse & Co., Chicago, as manager of engineering, is the inventor of an interlock-hydraulic control for water gas manufacturing and an exhaust silencer. He is a member of the American Society of Mechanical Engineers, the Society of Automotive Engineers, Society of Naval Architects and Marine Engineers and is a member of the Technical Committee of the American Bureau of Shipping.

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Robert M. Reid, former assistant traffic manager, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., has been appointed traffic manager, succeeding the late John H. Schroeder.

—o—

Thomas W. Butler, general manager of the Alton District Manufacturers' Association, was elected president of the Illinois Industrial Council at a three-day conference in Chicago Heights, Ill. **Ross Bowles,** manager of the East Side Associated Industries, was elected vice president. The council is closely affiliated with the Illinois Manufacturers' Association, and **James L. Donnelly,** executive vice president of that association, was re-elected secretary-treasurer.

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Richard W. Grace has resigned as president and treasurer of the Superior Switchboard & Devices Co., Canton, O., which recently was taken over by the Union Metal Mfg. Co., Canton.

—o—

David M. Salsbury, former manager, North Pacific district, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed general manager of the Westinghouse Electric Supply Co., New York. **William M. Jewell,** formerly acting manager at Detroit and San Francisco manager, succeeds Mr. Salsbury as North Pacific manager, with headquar-

ters in Seattle. **John H. Fisher,** who has been general manager at company headquarters in New York since April, 1942, has been made Middle Atlantic district manager, Philadelphia.

—o—

George M. Gillen, who has been in charge of advertising and sales promotion for Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld Inc., Coatesville, Pa., since 1935, has been appointed assistant manager of combined sales of Lukens Steel Co. and subsidiaries. In his new capacity, Mr. Gillen will be concerned with the co-ordination of the sales departments and sales programs of the three companies, and for the present he will continue to have general supervision of advertising activities. Mr. Gillen is a member of the American Iron and Steel Institute and the National Industrial Advertisers Association.

—o—

W. H. Steinkamp has been made assistant general sales manager, Brown Instrument Co., Philadelphia, a division of Minneapolis-Honeywell Regulator Co. During the past 13 years Mr. Steinkamp has represented the Brown company in New York, Buffalo, Cleveland and Pittsburgh, where he served as branch manager.

GEORGE M. GILLEN

W. H. STEINKAMP

HERBERT M. FAUST

—o—

Herbert M. Faust, former advertising manager of the Curtis Publishing Co., Philadelphia, has been named director, Salvage Division, War Production Board, Washington, succeeding Paul C. Cabot.

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C. A. Priest has been named manager of the transmitter division, electronics department, General Electric Co., with headquarters in Syracuse, N. Y.

OBITUARIES . . .

Max M. Broad, 58, president, Fisher Iron & Metal Co., Muskegon, Mich., with headquarters in Detroit, died in Detroit Sept. 13.

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Stuart J. Saks, 52, president, Morris Machine Works, Baldwinsville, N. Y., died Sept. 13 in Syracuse, N. Y.

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Niels M. Hansen, 74, president, N. M. Hansen Mfg. Co., Toledo, died Sept. 13 in that city. Mr. Hansen, who organized his company in 1919, was nationally prominent in experimentation and development of precision instruments.

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William J. Donnelly, 60, former treasurer of the George A. Smith Casting Co., Milwaukee, died Sept. 11 in that city. Mr. Donnelly had retired in 1941 after 43 years with the casting company.

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Herman C. Schlack, 60, manager, Airflex Equipment Co., Detroit, died recently in Milwaukee.

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Hal W. Hardinge, 87, who was chairman of the board, Hardinge Co. Inc., New York, died Sept. 15 in Forest Hills, N. Y., after a long illness. A well-known mining and metallurgical engineer and inventor, Mr. Hardinge had retired as president of the Hardinge company in 1939.

—o—

Charles W. Hills Jr., 55, Chicago, patent attorney and chairman of the finance committee, Houdaille-Hershey Corp., Detroit, died Sept. 19 in Lake Forest, Ill. Mr. Hills was also a director in a number of automatic and engineering companies, a trustee of the Illinois Institute of Technology and until recently president of the trustees, Armour Research Foundation.

—o—

William H. Taylor, 78, office manager, Equipment Steel Products division, Union Asbestos & Rubber Co., Blue Island, Ill., died Sept. 14 in Chicago.

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James S. Dickie, 64, a vice president and consulting naval architect of the American Ship Building Co., Cleveland, died there Sept. 20.

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William M. Brodie, 76, pioneer in chemical engineering, died Sept. 15 in Utica, N. Y.

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Alfred J. Chamberlin, 54, president, Chamberlin Developments Co., Milwaukee, died there Sept. 15.

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Earle Stone, 57, assistant to the vice president, American Smelting & Refining Co., New York, until his retirement two years ago, died Sept. 15 in Pelham, N. Y.

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Franklin H. Dewey, 62, vice president of the Gar Wood Industries Inc., Detroit, died recently in Grosse Pointe, Mich.

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Richard A. Leussler, 56, vice president, Omaha Steel Works, Omaha, Neb., died in that city recently.

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Richard P. Howell, 63, treasurer of the J. I. Case Co., Racine, Wis., since 1929, and a member of the board, First National Bank & Trust Co., Racine, died Sept. 16 in Rochester, Minn.

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John J. Danner, 83, founder, Twin City Iron & Wire Co., St. Paul, and president until his retirement three years ago, died there recently.

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William S. Harley, 62, treasurer, chief engineer and one of the founders of the Harley-Davidson Motor Co., Milwaukee, died Sept. 18 in that city.

—o—

Henry L. Brueggemann, 46, director of purchases, Acme Steel Co., Chicago, died suddenly Sept. 15 in Palos Park, Ill. Mr. Brueggemann was a former president of the Purchasing Agents Association of Chicago and was a director of the National Association of Purchasing Agents.

HENRY L. BRUEGGEMANN

Voorhees Urges Clear Reports

U. S. Steel executive tells Controllers corporation reports should be understandable to the public

"UNLESS we secure in America an understanding of the components of a healthy production and distribution there can be no future for the enterprise system or for the United States," declared Enders M. Voorhees, chairman, finance committee, United States Steel Corp., addressing the Controllers' Institute of America at the Waldorf-Astoria hotel, New York, Sept. 21.

Pointing out a great deal is heard about production for use as being more desirable than production for profit, Mr. Vorhees said if the art of producing for use involves giving without receiving, it involves the breeding of a race that can live on unrationed air.

The subject of his address concerned the annual corporation report, which, he said, can be changed into a living, pulsating thing that will carry to the American people the documented story of "how and by what we live."

He declared the controllers as bookkeepers for industry possess the means to show that many of the movements which are labeled progressive are viciously retrogressive.

"So cramped has our style become," he said, "we are leaving the social field to the bureaucrats and reformers who, because they do not have to make ends meet, are limited only by the capacity of their imaginations.

Our records are the master tools of our economy and they provide the facts which represent the things that go to make up our economy. The total of our records is the national economy. If each of us presents our segment in understandable form, the total national economy will be understandable and as a nation we shall be in a position to arrange and govern ourselves on the facts, instead of, as at present, by trial and error."

ENDERS M. VOORHEES

Wages and taxes which increase faster than the slack taken up by efficiency must be paid for by the customer, Mr. Voorhees said.

Mr. Voorhees concluded his remarks by stating that public opinion is formed by relatively few; that in every shop, public opinion is formed by a small number of highly intelligent workers and the same is true of every community.

"It is our job to furnish these people with the facts on which they can form their opinions. Ours is not the task to make a case for business, for labor, for management, for stockholders or for any particular group. Ours is always the task to make the case of truth and the facts as they are and to do it in clear language that will convey its complete understanding."

SAE Plans Aircraft Conference in Los Angeles

Brig. Gen. E. E. Adler, chief, personnel and training division, Air Service Command, will speak on military aircraft operation at the general session of the Society of Automotive Engineers' engineering and production meeting at the Biltmore hotel, Los Angeles, Sept. 30 to Oct. 3.

The meeting is sponsored by the SAE and its four Pacific Coast sections in cooperation with the Aeronautical Chamber of Commerce, Air Transport Association, and National Aircraft War Production Council.

The program includes engineering discussions of field maintenance, aircraft propellers and engines, and interchangeable power plants on Sept. 30. On Oct. 1 discussions of aircraft accessories and production, and power plant installations will be held. A discussion of aircraft engineering will conclude the conference on Oct. 2.

Electrochemical Group To Discuss Electro-tinning

Several papers of interest to the metal industries will be presented at the fall meeting of Electrodeposition Division of the Electrochemical Society at Hotel Commodore, New York, Oct. 13-16.

Electrotinning of strip steel has focused attention upon continuous plating practices and a symposium on this subject has been arranged.

Among papers definitely scheduled for the symposium are: "Electrogalvanizing of Strip Steel", by H. E. Lyons Jr., Meaker Co., Chicago; "Electrolytic Tin Plate from the Can Maker's Point of View", by K. W. Brighton, American Can Co., Maywood, Ill.; and "Tin Plating from the Potassium Stannate Bath", by F. A. Lowenheim, Metal & Thermit Corp., Rahway, N. J.

Historical development of electrolytic tinning will be outlined by E. W. Hopper, Crucible Steel Co. of America, Midland, Pa., in a paper titled "Development of Crucible Electrolytic Tin Plate Process".

Further papers referring to electroplating follow: "Corrosion Resistance of Silver Plated Steel", by P. J. Lo Presti, Rochester, N. Y.; "Iron Plating", by W. B. Stoddard, Champion Paper & Fiber Co., Hamilton, O.; "Novelties in Electroplating", O. P. Watts, University

They Say:

"You can't be master of the air with a bankrupt industry. By present tax and renegotiation policies we are legislating the aircraft industry out of existence."—**Ralph S. Damon**, vice president, American Air Lines.

• • •

"I don't believe that we can sustain anything by subsidies, and I hope we can gather the strength and intelligence to free ourselves of the subsidy habit of thinking. I am a believer in economic values, and America simply must come to the understanding that subsidies create depression. They interfere with prosperity because they interfere with man's challenge to achievement."—**Henry J. Kaiser**, West Coast industrialist.

"Those who fear an adequate American fleet are apparently thinking in prewar terms. There is every reason to hope and believe that the winning of the war will lead to an expansion of commerce throughout the world which should provide more employment for the ships of all nations."—**Frank J. Taylor**, president, American Merchant Marine Institute.

• • •

"Constant reaching out by national tax collectors is making it increasingly difficult for the state and local governments to collect enough taxes to carry on. A federal-state boundary line must be drawn in the revenue raising field. An unbiased study of the whole subject should be made, and a definite policy adopted."—**Gov. Saltonstall** of Mass.

of Wisconsin, Madison, Wis.; "Electrodeposition of Cobalt-Tungsten Alloys from an Acid Plating Bath", by M. L. Holt, R. E. Black and P. F. Hoglund, University of Wisconsin; "Study of the Disposition Potentials and Micro-structures of Electro Deposited Nickel-Zinc Alloys", by B. Lustman, Carnegie Institute of Technology, Pittsburgh.

"Nickel Plating of Fine Steel Wire" will be discussed by J. H. Conolly and R. Rimbach, Hanover Wire Cloth Co., Hanover, Pa. "Corrosion of Tin-Nickel Alloy Coating on Steel and Can Foodstuffs" will be discussed by R. H. Copson and W. A. Wesley, International Nickel Co., Bayonne, N. J., and "A Sulphate Chloride Solution for Iron Electroplating and Electroforming," by R. M. Schaffert and D. W. Gonser, Battelle Memorial Institute, Columbus, O.

Postwar Planning Sessions To Highlight Metal Show

Feature of the National Metal Congress and war conference displays at the Palmer House, Chicago, Oct. 18-23, will be a series of 17 sessions devoted to war production, conservation and postwar planning, presented by the American Society for Metals.

Technical programs will be presented by the three national societies, co-operating with the ASM. They are the Wire Association, which meets at the LaSalle hotel, American Welding Society at the Morrison hotel, and the American Institute of Mining and Metallurgical Engineers, Iron and Steel Institute of Metals Divisions, at the Sherman hotel.

Light equipment, such as X-ray machines, furnaces, and welding and brazing units, will be displayed.

Hardware Group To Confer In New York, Oct. 18-21

William Benton, vice chairman, Committee for Economic Development and vice president of the University of Chicago, will speak on postwar planning at the war conference of the National Wholesale Hardware Association's war conference at the Hotel Commodore, New York city, Oct. 18-21.

Other prominent speakers appearing at the war conference will be Wilfred Sykes, president, Inland Steel Co.; Arthur D. Whiteside, War Production Board; Louis Levine, chief, Reports and Analysis Service, War Manpower Commission; Henry J. Allison, chairman, Glasgow-Allison Co., Charlotte, N. C.

Tool Engineers To Meet at Indianapolis, Oct. 10-13

Eleventh semi-annual meeting of the American Society of Tool Engineers will be held at the Claypool hotel, Indianapolis, Oct. 10-13.

Robert L. Fitzsimmons, assistant chief metallurgist in charge of armor plate heat treating, R. C. Atkins Co., Indianapolis, is chairman of the session on new heat treating techniques.

The session on materials handling and plant layout will be directed by A. E. Rylander, master mechanic, Midland Steel Products Co., Detroit.

John L. Behler, works manager, Indiana Gear Works, Indianapolis, will be chairman of the session on gearing and the session on tooling for the inexperienced operator will be under the chairmanship of Wendell Macy, sales manager, Logansport Machine Co., Logansport, Ind.

WINS "E" AWARD: Ferro Machine & Foundry Co., Cleveland, was awarded the Army-Navy "E" award for excellence in war production Sept. 17. Shown at the microphone is Mayor Frank J. Lausche of Cleveland

BRIEFS . . .

Electro Refractories & Alloys Corp., maker of refractories and grinding wheels, has moved its general offices from 25 Court Street, Buffalo, to the Vars building at 244 Delaware avenue.

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Detroit Rex Products Co., Detroit, announces adoption of a new company name, Detrex Corp.

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Claude B. Schneible Co., Chicago, announces it has moved its sales and general offices from 3951 Lawrence avenue, Chicago, to 2827 Twenty-fifth street, Detroit. A sales office will be maintained in Chicago at 4554 North Broadway.

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Aro Equipment Corp., Bryan, O., has been awarded a white star for its Army-Navy "E" flag.

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Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces that Irving W. Clark has been appointed manager of the newly organized Better Homes Department with headquarters in Pittsburgh.

—o—

Central States Steel Inc., Kansas City, Mo., has purchased five of seven plants from the Nichols Wire & Steel Co., including plants at Kansas City and Joplin, Mo., Oklahoma City and Tulsa, Okla., and Council Bluffs, Ia. Nichols Wire & Steel Co., which has removed its executive and sales offices from Kansas City, Mo., to Davenport, Ia., will continue to operate its plants at Davenport and Mason City, Ia.

More Industrial Plants Granted Production Awards

Army-Navy awards were made to the following metalworking and metalproducing plants for outstanding records in war production:

Bendix-Westinghouse Automotive Air Brake Co., Elyria, O.
Champion Spark Plug Co., Toledo, O.
Cushman Motor Works, Lincoln, Neb.
Electro-Motive Mfg. Co., Willimantic, Conn.
General Motors Corp., Ternstedt Mfg. Division, Detroit, and Oldsmobile Division, Kansas City, Mo.
Hydrawmatic Machine Corp., New York city.
Independent Engineering Co., O'Fallon, Ill.
Kent Metal & Chemical Works, Edgewater, N. J.
Line Material Co. of Pennsylvania, East Stroudsburg, Pa.
Mid-West Forging & Mfg. Co., Chicago Heights, Ill.
Novocol Chemical Mfg. Co. Inc., Brooklyn, N. Y.
Scott & Williams Inc., Laconia, N. H.
United Aircraft Products Inc., Vernon, Calif.

Future "E" Awards to Steel Plants To Be Made by WPB

Nominations for steel company "E" Army and Navy awards will be made in the future by the WPB Steel Division, according to a new policy just adopted.

Up to this time nominations for these "E" awards have been made by the Army and Navy. These awards go to plants producing raw materials and machine tools.

PRECEDENT UNSALUTED AT KAISER STEELWORKS

Fontana plant, built on 1300 acres of farm land with snow-capped mountains for a background, is West Coast's first fully integrated steel producing industry. . . Future tied to population growth in Pacific area and expanded export markets

By JOHN D. KNOX
Steel Plant Editor

WHAT a surprising sight to an easterner, particularly one from the Pittsburgh district, upon turning down a country road in California to see in the distance an iron and steel plant in the midst of 1300 acres of farm land with snow-capped mountains for a background!

The country about is as level as a billiard table, and there are no clouds of black smoke belching from furnace chimneys—in fact no smoke at all is discernible save flimsy red oxide fumes from chimneys at the open hearths.

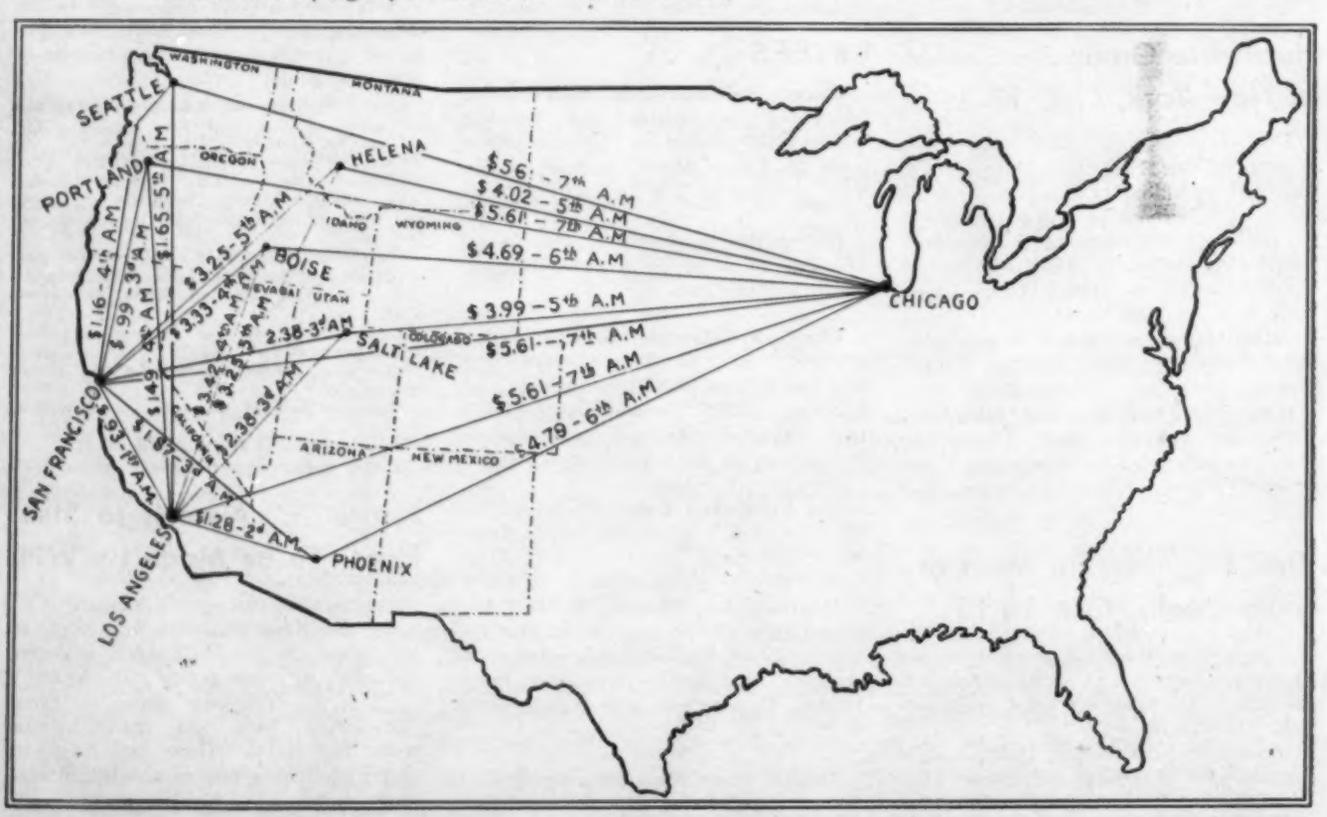
There in the distance, in the midst of that 1300-acre plot of farm land, is the steel plant of Kaiser Co. Inc. It is an integrated steel plant, from blast furnace to rolling mills, something that has been in the minds of west coast folk for many a decade.

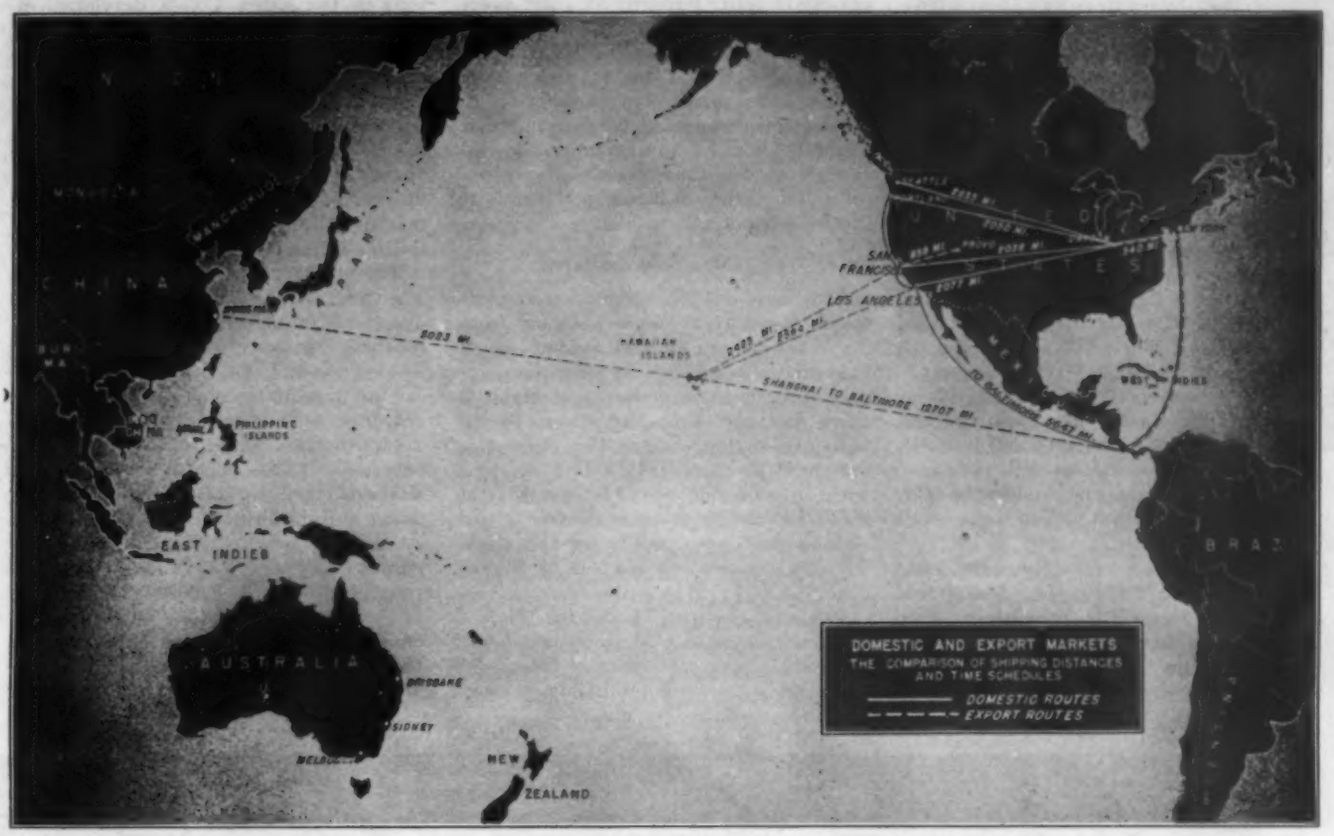
Ground for the blast furnace was broken April 20, 1942. This date may not mean anything to the average person, but it does to a European paperhanger for it is Hitler's birthday. The initial campaign of the stack started Dec. 30, 1942. It is not the first stack on the Pacific Coast to make iron, for Aug. 24, 1867, the Oregon Iron Co. operated the 6-ton Oswego old stone furnace near Portland, Oreg. Neither is this plant at Fontana the first plant on the Pacific Coast to send rolled steel over the cooling beds at the finishing end of the mill. The first steel ever rolled on the Pacific Coast was put through a 14-inch bar mill at Irondale, Wash. in 1909.

But Kaiser's plant is the first *integrated* steel plant—from by-product coke ovens to blast furnace to finishing mills—to be built and operated on the Pacific Coast.

Kaiser's organization from the key men down to the straw boss is permitted to do "something" that would cause employes of any eastern iron and steel plant to raise their eyebrows in amazement. And that "something" has put a punch in his workmen. Not a trace of static is observed in his organization from the time you enter the mill gate until you leave. Everyone is dynamic in his makeup. Many of the departmental heads arrive at the usual time but often stay until long after the 6 o'clock whistle blows. No one seems to be in a hurry to get home, and many upon arriving at their homes can hardly wait to get back to the plant again. Hours mean little to the young organization at

Freight rates per 100 pounds and number of days involved in delivery of less-carload-lot freight from inland to West Coast cities





Comparison of shipping distances involved in domestic and export routes

Kaiser's plant—all because of that "something" which they have been permitted to do.

Precedent seldom is allowed to be saluted. Initiative is out in the open. When problems arise an effort is made to arrive at some solution before nightfall; many nights find key men poring over drawings and discussing the point at issue. Conversation is not filled with Mr. This or Mr. That; it is Tom or Bill or Jack. And when the proper solution to problems is found, decision is made promptly to remedy the situation so that the decks will be clear for the next day's work. What is the impelling force back of it all? Merely that "something" which Kaiser's men have the privilege of doing.

That "something" is this: His men from one end of the plant to the other—from the sweep-up man to the man seated on a leather-covered swivel chair over in the plant administration building—have been extended the privilege of *expressing* themselves. Whenever anyone sees an opportunity of doing or making something just a little better than his eye discerns, it is done without having to wait for belated permission from the front office miles away. You say this method is no good; that it leads to too many mistakes? Well, it is working at the Fontana plant. Certainly the men make mistakes, but they don't make the same mistake the second time. The management feels that by relegating responsibility and authority to its men and allowing them to express their ideas has many advantages, not the least of which is economy and low operating costs. Many illustrations closely identified with operations at the Fontana division could be cited but they would involve bringing names of manufacturing concerns out in the open; however, to avoid this, one is borrowed from the magnesium plant at Permanente, Calif.

A lad in his twenties in charge of an experimental foundry noticed a pile of copper scrap which had accumulated just outside the door of his office. The scrap material, known as glands, was used to effect an airtight seal at the base of the retorts in which magnesium is cooled by natural gas. Considerable machining of the glands was necessary to bring them to specification which when added to the cost of the copper brought the cost of each gland to around $5000. Their life was short because of the high temperatures to which they were exposed.

Drastic Reduction in Cost

Would the lad be sticking his neck out by suggesting that these glands could be made from a different metal at a drastic reduction in cost? Not a bit of it. That is exactly the kind of expression the Kaiser management looks upon with a feeling of gratitude.

Outside engineering advice was solicited concerning the feasability of making the gland out of a different metal. The engineers advised against the change. It wouldn't work, they stated. Leakage at the joint would occur because of expansion and contraction.

After the Kaiser executives digested the report they turned it over to the lad in the experimental foundry. He asked permission to purchase a sufficient quantity of the certain metal; it was granted.

Suitable patterns of a gland were made, molds were prepared and the day the metal arrived, he started pouring. The gland was machined and placed in service. This is what happened. The cost of the gland was reduced from around $5000 to a little less than $500, and instead of yielding a campaign of about three weeks the gland made by the experimental foundryman from a different kind of metal was still in service after a 3-month run and was still going strong.

This happens at Kaiser's holdings right along and serves to illustrate what occurs when an employe in the lower brackets is allowed to express himself. It is the stuff that makes for a dynamic organization; it is the vital force back of the men operating Kaiser's iron and steel plant at Fontana; it is that "something" the visitor senses the moment he enters the plant enclosure.

Many distinctive features are to be found in the design of the Fontana plant. Because of the existing shortage of critical materials every effort was made to substitute reinforced concrete construction for steel. Materials are stored in concrete bins; products of combustion are exhausted by concrete stacks. Any place concrete could be employed it was specified by the engineers. The plant is located near the fault zone and for this reason care was taken to make all buildings earthquakeproof. Most of the structures are designed with a seismic coefficient of plus 10 per cent but where tall stacks are involved above the foundation a 25 per cent seismic coefficient was used.

Every effort was made in laying out the plant not to disturb vegetation. For

instance eucalyptus trees serving as windbreaks run east and west on 660-foot centers. The by-product coke plant was located between two rows of these trees. The blast furnace, power house and open-hearth buildings are separated from the service group of buildings by similar trees.

Then, too, about 550 acres of the 1300-acre plant site are under cultivation at the present time—not because the Kaiser company desires to engage in agriculture, but because a large portion of the land was farm land when the site was purchased. About 200 acres are planted in hay; 150 in walnuts; 96 in grapes; 15 each in citrus, yams and beans; 30 in sweet potatoes; 11 in truck garden vegetables; 5½ each in corn and melons; 4½ in tomatoes; and 2 in irish potatoes. The largest part of the produce is sold to the cafeteria, the Vulcan mine and the wholesale trade.

Eastern plants are not confronted with the problem of water supply. But at the Kaiser plant there is no river handy. The supply of water is secured from the local water company and from wells. Consequently every effort is made to reduce the amount of water required for plant operation to a minimum. All water used throughout the plant is recirculated and the only loss is that due to evaporation.

Then, too, precautions were taken to eliminate contaminated waste water that might be harmful to vegetation; special equipment has been provided to dephenolize the waste liquor in the stills at the by-product coke works.

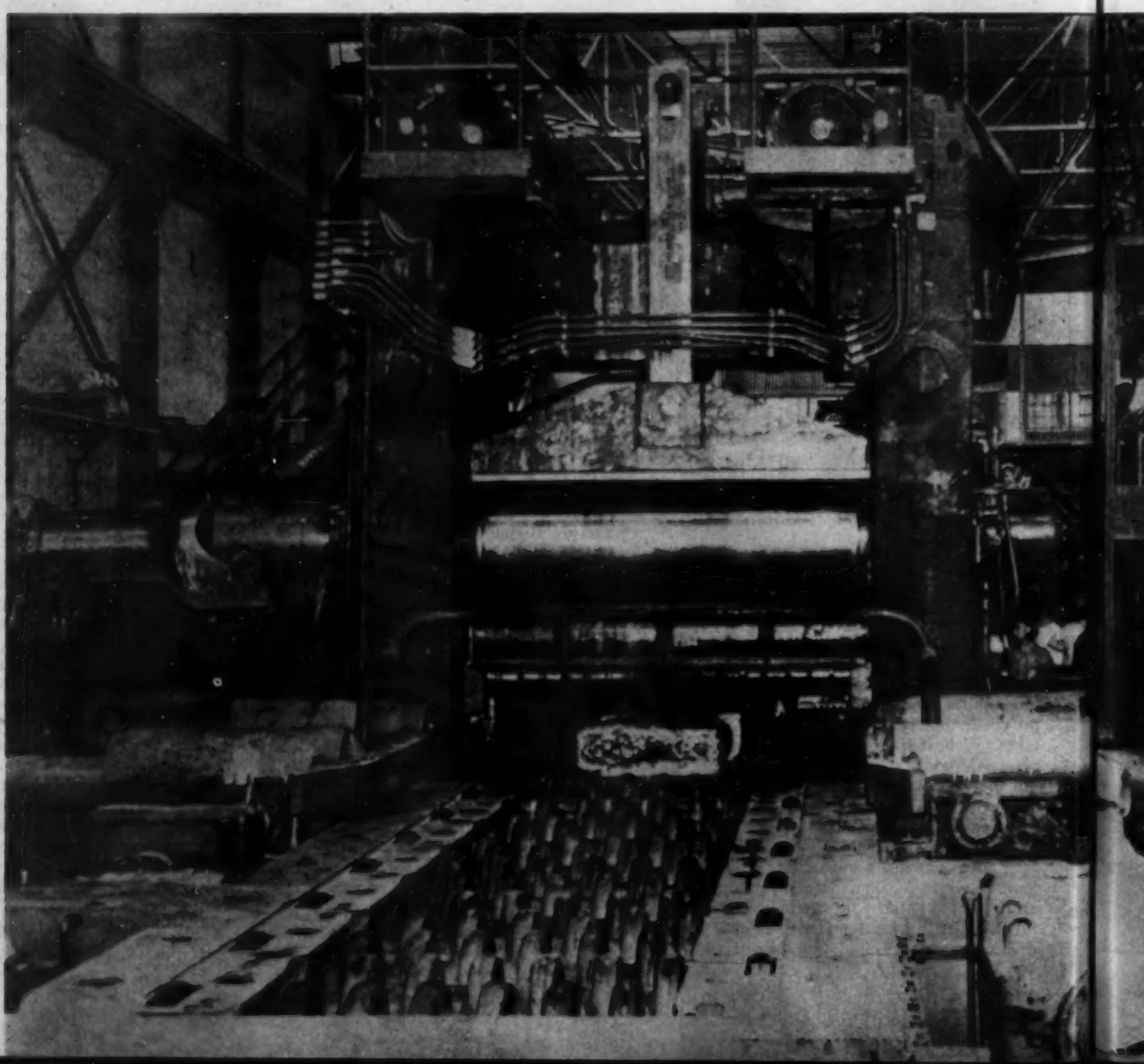
Raw Materials Scattered

Raw materials are obtained from scattered sources. Iron ore is obtained from the Vulcan mine, a Kaiser holding which is located about 176 miles from the plant in San Bernardino county and about 9 miles southeast from the Union Pacific railroad's station, Kelso. The deposit is estimated to contain 5,050,000 net tons with an economic open-pit operation of 2,175,000 net tons—equivalent to a two and one-half year supply for the stack. The ore has an iron content of 51 per cent.

Coal is obtained from the No. 2 Sunnyside mine in Carbon county, Utah, 807 miles from the plant. The mine, leased from the Utah Fuel Co. and operated by the Kaiser Co., is developed at present to produce 1800 net tons of prepared coal per day. It is estimated that this deposit will yield 15,000,000 net tons of coal or a mine life of 22 years.

Limestone is purchased from the California Portland Cement Co. at Colton, about 9 miles from the plant. Stone of fluxing quality also is available in large quantity within a radius of 30 miles from the blast furnace.

The plant is built around three projects. The first involves 90 by-product coke ovens, a 1200-ton blast furnace, four 185-ton basic open-hearth furnaces, 110-inch 2-stand tandem plate mill, and the Vulcan ore mine and Sunnyside coal mine developments. The second project involves a tar distillate plant. The third project covers two 185-ton open-hearth furnaces, slow-cooling ingot pits, a 36-inch breakdown mill, a 28-inch structural mill and a merchant mill with alloy finishing facilities. The total cost of the plant when completed will be $90,000,000; it is financed by an RFC loan. The estimated annual production will be 432,000 net tons of pig iron, 675,000 net tons of ingots and 472,000 net tons of finished rolled



products. Products are made in the following range of sizes:

Product	Inches
Blooms	4 x 4 to 12 x 12
Billets	1¾ x 1¾ to 4 x 4
Plates	100 max., ⅛ min. thick
Rounds and squares	¼ to 6
Flats	¼ x 2 to 1 x 20
Angles	¾ to 8
I-beams	1½ to 18
Wide flange beams	8 max.
Channels	¾ to 15
Bands-strip	1 to 16
Reinforcing bars	⅜ to 1½

The plant is laid out so that expansion can proceed in an orderly manner as conditions warrant.

Sintered ore and flue dust are provided by a single strand sintering machine, 72 inches wide by 102 feet long. Products of combustion are exhausted into the atmosphere by a concrete stack 12 feet inside diameter and 300 feet high. The plant has a nominal capacity of 1500 gross tons of sinter (ore and dust) per day and 450,000 tons annually of fine ore on the basis of continuous operation.

Instead of operating on a group of ores such as is the custom at eastern furnaces, the Kaiser stack is burdened on one ore both in the natural state and sintered.

The ore receiving, crushing, screening, storing and reclaiming system is designed to handle 833,000 tons of ore per year based on an 8-hour work day. The storage piles of finished ore are sufficient for maintaining a 10-day supply of material. The bedding system includes four piles of 12,000 tons each. The raw material storage pile has capacity for 100,000 tons of ore.

Coke is supplied by two batteries of 45 ovens each of the Koppers-Becker underjet compression type. Each oven has capacity for 14.4 net tons of coal. Carbonizing capacity based on 18 hours coking time is 1728 tons of coal per day equivalent to a daily yield of 933 tons of coke.

Moved by the Conveyor Belts

Screened coke is transferred from the ovens to the bins at the blast furnace by conveyor belt, thus differing from eastern practice. Kaiser moved everything by conveyor belts while building the Grand Coulee and Bonneville dams so why not keep coke flowing to the furnace bins by this means? The coke is more fragile than eastern cokes so that this arrangement of handling is highly satisfactory in holding breakage to a minimum.

The blast furnace is 97½ feet high and has a hearth diameter of 25½ feet. Three stoves, 25 x 115 feet, supply the hot blast. Hot metal is transferred in 150-ton mixer-type ladles either to the 800-ton mixer located in the open-hearth building, or to a double strand pig machine where it is cast into 30 or 60 pound pigs to suit the specification.

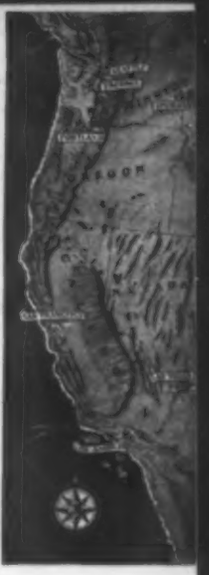
Incidentally, a 50-ton carload of pig iron from the Fontana stack was delivered at the plant of the Western Foundry Co., Portland, Oreg., May 27, it being the first shipment to a Pacific Northwest plant since the stack was blown in. The metal was used in marine engines for Liberty ships built at Kaiser's Oregon Shipbuilding Corp. This marked the beginning of the Kaiser production cycle—from mine to completed vessel.

Steelmaking facilities comprise six 185-ton open-hearth furnaces which are built with sloping backwalls and five charging doors each. Nos. 1 and 2 furnaces are provided with waste-heat boilers. No. 6 furnace is a 185-ton tilter which may be used for duplexing. Furnace chimneys, 6 feet inside diameter and 175 feet high, are built of concrete and brick lined to the top.

Facilities are provided for basket pouring and for hot-top pouring in the case of alloy steel ingots.

Six 2-furnace batteries of recuperative soaking pits fired with coke oven gas equalize the temperature of the ingots. Each battery has a 110-foot concrete self-supporting stack. Slow-cooling pits also are installed for alloy steel ingots.

First slab being converted into plates on the 132-inch tandem plate mill, Aug. 19, 1943.



The pit crane handles ingots up to 20,000 pounds in and out of the pit furnaces. A foundry, 420 x 96 feet is equipped to pour 80 tons or more of ingot molds daily using direct metal. In addition, a cupola and modern mold facilities are provided to produce miscellaneous castings for repair work. A pattern shop and storage serve the foundry.

Excess blast furnace and coke oven gas is sufficient to meet all fuel requirements of the plant with the exception of 440 barrels of fuel oil per day for the open-hearth shop. Blast furnace gas of 85 B.t.u.'s is burned at the hot blast stoves, the coke ovens and the high-pressure boilers. Coke oven gas of 550 B.t.u.'s is used at the coke ovens, open-hearth furnaces, soaking pits, reheating furnaces and office and shop buildings. Fuel oil in combination with coke oven gas is employed for firing the open-hearth furnaces.

Blast furnace gas normally is used under three boilers for generating all high-pressure steam—one being a stand-by boiler. These boilers also can be operated on coke oven gas or fuel oil. Low-pressure steam is generated by two waste-heat boilers at the open-hearth department.

Rolling Mills Described

Slabbing ingots for conversion to plates are broken down on a 2-high reversing mill with the 42 x 110-inch rolls direct driven by two 3500-horsepower direct-current motors. Breakdowns coming from this stand are finished rolled on a 3-high stand with the 24 and 38 x 112-inch rolls driven through a stand of pinions by a 7000-horsepower motor. The 112-inch finishing stand was placed in operation Aug. 19, and the 110-inch breakdown stands a few weeks later.

The structural mill comprises a 36-inch 2-high reversing stand and three stands of 29-inch finishing rolls, two stands of the latter mill being equipped with 3-high rolls and one with 2-high rolls. The mill is laid out so that equipment for rolling rails as well as for increasing the capacity of other shapes may be added when needed.

The merchant mill includes four 21-inch roughing stands, eight 18-inch intermediate and two 14-inch and four 10-inch finishing stands.

Service buildings are located in one group. All are built of reinforced concrete with structural steel roof trusses over the center aisle. One building, 100 x 304 feet, houses the machine shop; another, 100 x 204 feet, houses the pipe, boiler and forge shops; another, 80 x 300 feet, the warehouse; and a 60 x 60-foot building, the garage. The electrical

(*Please turn to Page* 130)

THE BUSINESS TREND

Spotty Production Gains Reflect Tough Going

WHILE Congress wrestled with manpower problems, renegotiation policies, and the pros and cons of father deferment from military service, and Pacific Coast plane plants gave centralized hiring its first western test, industrial production recorded minor gains for the latest weekly period.

Munitions production continued to move upward. Steel output pressed capacity levels. Automobile and truck manufacture rose nearly 2000 units for the week. Petroleum production increased its daily average substantially. Electric power distribution, after dropping back last week, again established a new high.

Revenue freight carloadings increased. With ton miles about 20 per cent higher than for the same period of 1942, this month the car surplus hit a record low point of 19,513 cars.

Bank clearings advanced sharply under impetus of the War Bond drive and the income-tax deadline.

RAILROAD EQUIPMENT—Comparison of the Association of American Railroad's figures for the first eight months of 1942 and 1943 suggests some of the limitations under which rail lines are operating. Class 1 roads had 28,433 freight cars and 1038 locomotives on order Sept. 1; at the same date last year there were 35,063 freight cars and 861 locomotives on order. During the first eight months of this year 15,744 new freight cars and 408 new locomotives were placed in service; for the equivalent period of 1942 the roads acquired 53,695 freight cars and 514 locomotives.

The association estimates total railroad operating revenues for August at $644,155,518, or 15.7 per cent higher than for the same month of 1942. Estimated freight revenues for last month were $474,936,359, or 9 per cent above those of August, 1942; passenger revenues are estimated to be $126,669,699, or 48.7 per cent greater.

WAR EXPENDITURES—In August the government spent $7,529,000,000 for war purposes, an increase of 12 per cent over the July total, but 2 per cent less than in June, when war expenditures amounted to $7,688,000,000. Average daily spending rates (excluding non-business days) were as follows: August, $289,600,000; July, $249,900,000; June, $295,700,000. From July of 1940 through this August the nation's war spending totaled $124 000,000,000.

LIVING COSTS—Though the cost of living has not yet dropped to the 1942 levels demanded by labor, good progress has been made. Preliminary figures for August disclose that living costs of wage earners' families have declined 0.3 per cent, reflecting the 0.9 per cent drop in food prices. The decline is registered in 48 of the 69 industrial cities for which indexes are available, ranging from a reduction of 0.2 per cent in several cities to 1.8 per cent for Flint, Mich. Boston, Houston, and Richmond, Va., showed no change, and living costs advanced in 18 other cities.

CONSTRUCTION—Volume of construction for the week was 79 per cent below the total for the corresponding week last year. The 1943 volume so far totals $2,365,700,000, or a weekly average of $63,938,000. For the latest period bridge construction is the only type of work for which a higher total is reported than at this time last year, but the amount involved is small. Private construction, with volume of $302,953,000, is 33 per cent lower and public construction, at $2,062,747,000, is off 70 per cent.

For July, construction activity in the United States declined 6 per cent to $659,511,000. August estimates show a volume of $603,450,000, down 9 per cent from the July figure.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	99.5	99.5	98.5	98.0
Electric Power Distributed (million kilowatt hours)	4,358	4,229	4,288	3,756
Bituminous Coal Production (daily av.—1000 tons)	1,920	2,015	1,958	1,781
Petroleum Production (daily av.—1000 bbls.)	4,375	4,353	4,239	3,935
Construction Volume (ENR—unit $1,000,000)	$43.3	$36.6	$31.8	$206.0
Automobile and Truck Output (Ward's—number units)	20,790	18,860	19,600	20,960

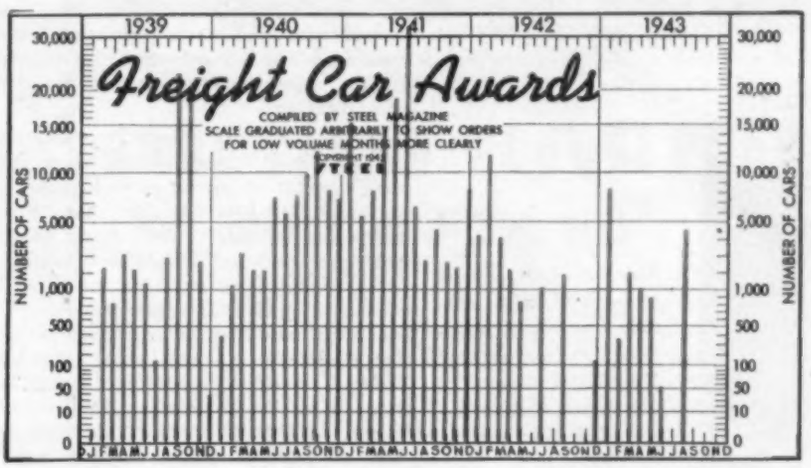
* Dates on request.

TRADE				
Freight Carloadings (unit—1000 cars)	924†	901	887	897
Business Failures (Dun & Bradstreet, number)	30	24	60	117
Money in Circulation (in millions of dollars)‡	$18,773	$18,740	$18,101	$13,440
Department Store Sales (change from like week a year ago)‡	None	+1%	+7%	+26%

† Preliminary. ‡Federal Reserve Board.

Manufacturers Durable Goods

	Orders		Shipments		Inventories	
	1943	1942	1943	1942	1943	1942
Jan.	293.5	333.9	298	214	211.8	179.2
Feb.	326.6	373.4	337	232	209.6	180.8
Mar.	349.2	344.4	330	235	210.7	183.4
Apr.	329.8	362.1	338	239	213.5	186.6
May	313.0	348.4	338	254	213.5	190.2
June	392.7	439.5	343	256	211.8	193.2
July	343.5	321.8	347	264	210.9	195.8
Aug.	.....	269.4	...	270	.....	198.0
Sept.	.....	314.5	...	283	.....	200.9
Oct.	.....	312.1	...	289	.....	204.1
Nov.	.....	334.7	...	300	.....	207.7
Dec.	.....	291.1	...	320	.....	210.1
Ave.	.....	337.1	...	263	.....	194.2


1939
1940
1941
1942
1943
Freight Car Awards
COMPILED BY STEEL MAGAZINE
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1943 STEEL
NUMBER OF CARS
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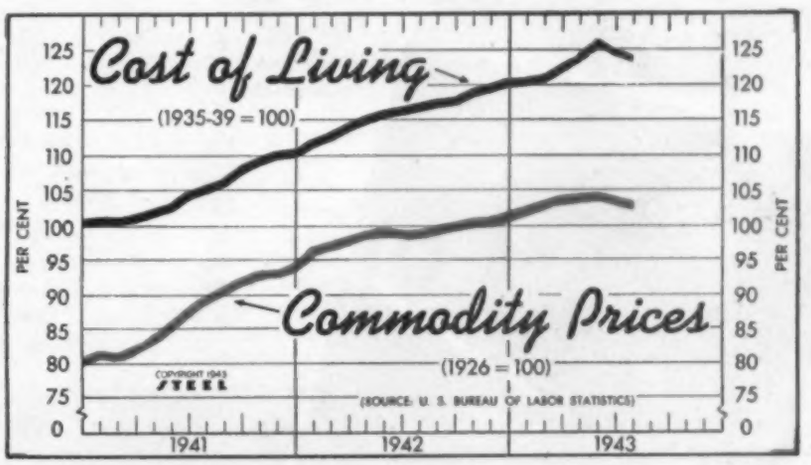
Freight Car Awards

	1943	1942	1941	1940
Jan.	8,365	4,253	15,169	360
Feb.	350	11,725	5,508	1,147
March	1,935	4,080	8,074	3,104
April	1,000	2,125	14,645	2,077
May	870	822	18,630	2,010
June	50	0	32,749	7,475
July	0	1,025	6,459	5,846
Aug.	4,422	0	2,668	7,525
8 mos.	16,992	24,030	103,902	22,019
Sept.	.....	1,863	4,470	9,735
Oct.	.....	0	2,499	12,195
Nov.	.....	0	2,222	8,234
Dec.	.....	135	8,406	7,181
Total	.....	26,028	121,499	66,889

Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926=100)			—Living Cost— (1935-39=100)		
	1943	1942	1941	1943	1942	1941
Jan.	101.9	96.0	80.8	120.6	112.0	100.8
Feb.	102.5	96.7	80.6	120.9	112.9	100.8
Mar.	103.4	97.6	81.5	122.8	114.3	101.2
Apr.	103.7	98.7	83.2	124.1	115.1	102.2
May	104.1	98.8	84.9	125.1	116.0	102.9
June	103.8	98.6	87.1	124.8	116.4	104.6
July	103.2	98.7	88.8	123.8	117.0	105.3
Aug.	.....	99.2	90.3	.....	117.5	106.2
Sept.	.....	99.6	91.8	.....	117.8	108.1
Oct.	.....	100.0	92.4	.....	119.0	109.3
Nov.	.....	100.3	92.5	.....	119.8	110.2
Dec.	.....	101.0	93.6	.....	120.4	110.5
Ave.	.....	98.8	87.3	.....	116.5	105.2



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions)	$10,062	$6,552	$7,812	$7,532
Federal Gross Debt (billions)	$152.5	$148.3	$146.8	$86.9
Bond Volume, NYSE (millions)	$59.9	$29.2	$37.7	$72.8
Stocks Sales, NYSE (thousands)	3,655	3,292	2,943	2,081
Loans and Investments (millions)†	$46,902	$46,739	$46,954	$34,322
United States Government Obligations Held (millions)†	$34,213	$34,100	$34,464	$20,525

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	248.0	247.5	245.3	232.7
Industrial Raw Materials (Bureau of Labor index)‡	112.2	112.3	113.5	101.6
Manufactured Products (Bureau of Labor index)‡	100.1	100.0	99.9	99.3

† 1931 = 100; Friday series. ‡ 1926 = 100.

HIGH-SPEED STEEL TOOLS

SILVER brazing of used high-speed cutting tools—formerly discarded as scrap—to shanks of ordinary steel has doubled the life of the cutting tools and sharply reduced production costs on a shell line of the Armstrong Cork Co., Lancaster, Pa.

The cutting tools are of 18-4-1 high-speed steel, which requires critical tungsten in its composition, and are used on 8-spindle Conematic turning lathes machining shell bodies. The tools measure 2⅛ inches in length and previously were scrapped when worn down to 1½ inches.

By brazing the used tool on to a shank of 1020 carbon steel, Armstrong has been able to increase its output of 20-millimeter armor piercing shot from an average of 25,000 to approximately 50,000 per each cutting unit. Under this new process, only a small sliver of high grade steel remains when the tool is finally discarded.

Formerly, highly important cost factor in the use of these tools was the number of man-hours required for machining, heat treating and grinding each unit. Armstrong purchases high-speed 18-4-1 steel in bar stock. After cutting to length, the tool must be machine formed, heat treated to achieve the desired degree of hardness, and then ground to precise specifications and finally speed-cased, the latter operation in itself increasing the life of the tool from 50 to 100 per cent. The development of silver composition brazing process thus saves hundreds of man-hours on these operations since the reclaimed tool retains its original temper and contour. In addition, it releases substantial quantities of high speed steel for other essential war production.

The suggestion of brazing used tools to shanks of ordinary steel was advanced by several Armstrong workers. They investigated the possibility of reclaiming high-speed steel after noticing quantities of worn tools scheduled to be discarded as scrap. Two major factors were involved: The first—that the tool would withstand cutting pressure after brazing. The second—that the temper of the steel would remain unchanged after brazing.

As a factor in reducing production costs on shell operations, the successful development of silver alloy brazing in reclaiming used tools is significant. Four cutting tools made of high speed 18-4-1 steel are required on each Conematic lathe. Officials estimate the cost of each new cutting tool is approximately $27, the major part of which represents skilled labor charges. Conservative estimates indicate that the reclaiming job can be done at a cost of between $6 and $12. Since the brazing operation doubles the life of each cutting tool and makes possible its early return to the production line this development represents a savings on each reclaimed unit of between 56 and 78 per cent.

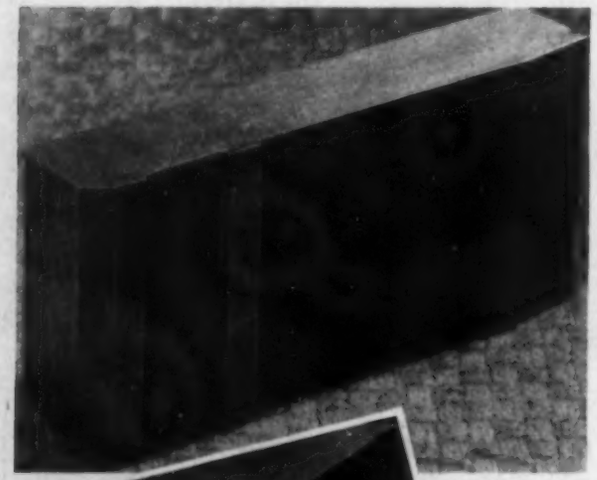
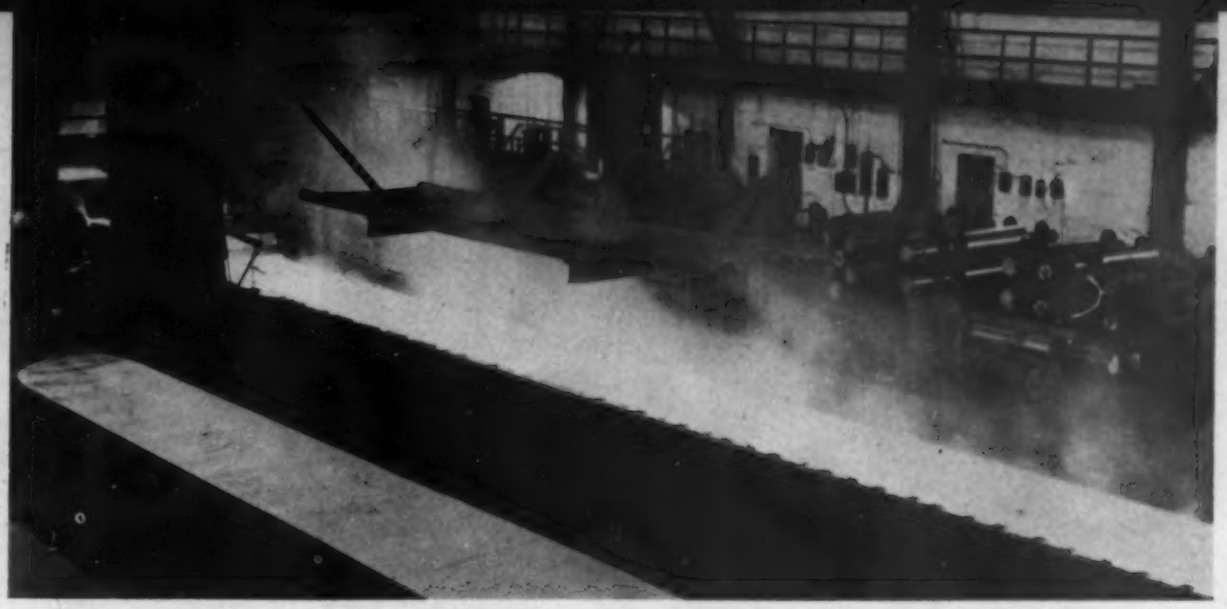


Fig. 1. (Left)—This high-speed steel cutting tool, worn down from its original length of 2⅛-inches to 1½-inches, was formerly scrapped

Fig. 2. (Left)—Now the worn tool is silver brazed to a shank of 1020 plain carbon steel, retaining the original contour of the form tool and its original temper. No machining, heat treating or grinding are required to put it back into use

Fig. 3. (Below)—Life of reclaimed tool has been more than doubled. When finally discarded only a fine sliver of high-speed steel remains as shown here. Dollar savings run from 56 to 78 per cent. Tool at right has also been reclaimed by silver brazing



Finished floor plate from continuous mill being laid down on cooling bed

SQUARE-TREAD FLOOR PLATE

Rolled on 4-High Mill

ONE OF the interesting recent developments in rolling steel is the method developed by Jones & Laughlin Steel Corp. for the production of its rolled steel floor plate "Jaltread".

If your memory takes you back to the days of the old sidewheeler—the familiar steamboat that used to run up and down the river and throw a smokescreen around the steel mill towns along the shore—you will recall the engine room with its vertical engines flanked on both sides by rows of ribbed steel plate which served both as a flooring and as a drainboard for conducting the oil splash back into the engine part. This was the original rolled steel floor plate. The plate had unusually good nonskid values in one direction only. It was produced by turning circumferential grooves in the top roll of a 2-high or 3-high plate mill and finishing the plate by one pass between a smooth roll and a grooved top roll.

Within a few years after the development of this ribbed plate it was found that by cornering the plate through the mill; that is, turning it approximately 30 degrees in feeding it into the gap of the rolls and then reversing the angle of entry to 30 degrees on the other side of the centerline of the mill, a diamond-shaped tread of appreciably better nonskid design in both transversal and longitudinal directions was produced. This was the initial floor-plate pattern.

Because the practice of cornering the plate in the pass confined it as to width and length, it was soon restricted. Manufacturers of floor plate, therefore, adopted the practice of milling the pattern roll with a series of predetermined designs in order to permit working the product straightway. The impression was milled on the work-roll face, and to transfer it to the plate required an entering thickness roughly equal to the height of the base plate plus the superimposed pattern. This required reductions on the last pass of as high as 35 to 45 per cent. The method of rolling made it difficult for the mill to lay a flat plate as delivered from the mill and it imposed excessive loads on both the mill motors and mill equipment.

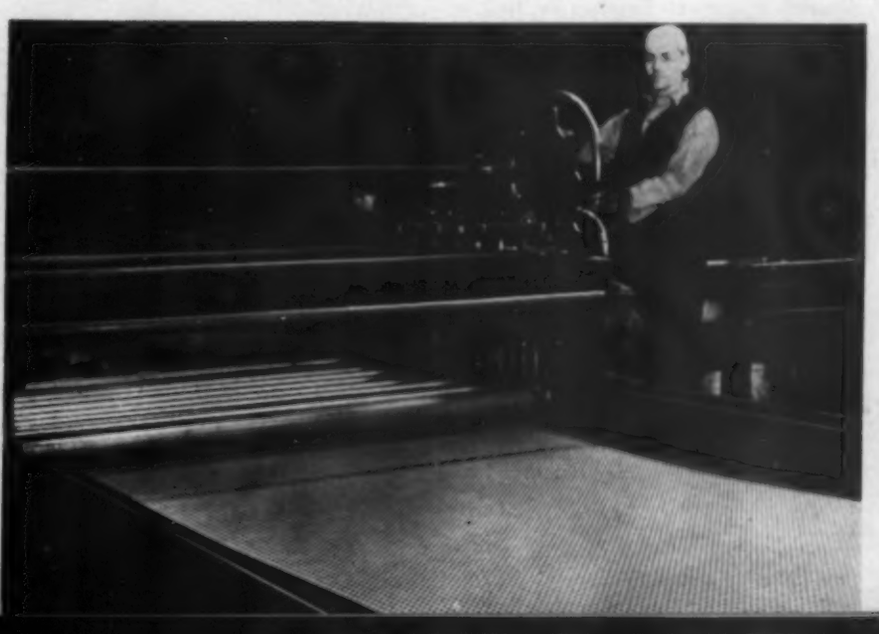
This whole method of rolling has been revised by the new method used by Jones & Laughlin at its Otis Works in Cleveland where floor plate is now rolled on its 4-high 77-inch continuous mill.

The pattern of the floor plate is in squares similar to the cleats on a football player's shoe. The finishing train of the continuous mill at the Otis division comprises six stands of 4-high rolls, following a 4-stand continuous roughing train. In rolling floor plate the roughing train and the first stands of continuous finishing rolls reduces the slab in a conventional method to the required thickness of the floor plate plus the thickness of the superimposed pattern.

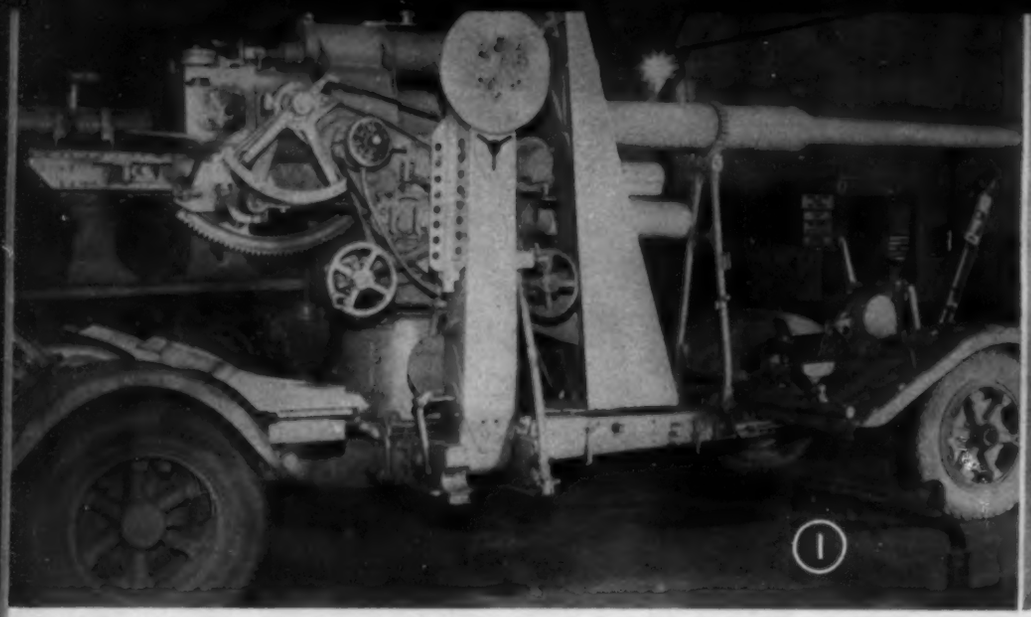
In the first stand of floor plate rolls the top work roll is designed with a series of circumferential grooves, developing a ribbed plate of the design initially described, while the second stand, whose work roll requires longitudinal grooves of the same contour, chops off the ribs to produce the regular pattern of square cleats.

Advantages of the square pattern are to secure better forming and welding properties on the plate as produced, as well as to produce a plate better adapted to cleaning and drainage. The advantages to the mill are better roll life and lighter reductions than had ever been required for the production of floor plate —in fact, the reductions on the two floor plate stands are almost identical with those conventionally used on a strip mill for the production of sheet and light plate.

The J & L pattern, which has now been on the market for approximately five months, has met with widespread acceptance in the trade as well as approval of the Navy and Maritime Commission.



Jaltread floor plate in transit through roller leveler



Army Ordnance Probes Secrets of ENEMY WEAPONS

Well organized system reports on battlefront developments in enemy weapons. Selected enemy equipment is collected here, carefully analyzed for new production methods, improved design ideas. Results not only show our competitive position but reveal important trends

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.
And
Contributing Editor, STEEL

APART FROM its major functions of design, production and maintenance of fighting equipment, the United States Army Ordnance Department has probably no more important responsibility than the keeping of a close watch upon new developments in enemy countries, lest we be taken by surprise and placed at a disadvantage in one phase of this gigantic conflict. Among modern highly intelligent peoples, possessed of every known resource of science and manufacture, such advantage is likely to be temporary and may indeed prove to be a boomerang. But the time lag may involve risk and, if prolonged, invite disaster.

A principal means, of course, by which we learn the secrets of enemy *materiel* is through capture or, in the case of planes, shell and so forth, by picking up the pieces within our own lines. During the last world war, for example, fragments of the shells fired on Paris by "Big Bertha" were picked up and sent over to Woolwich Arsenal, where a copy was easily made for investigational purposes. Similarly, in this war enemy explosives found in abandoned tanks, sunken submarines, etc., are taken and analyzed. Fuze designs are studied; steels used are submitted to metallurgical examination; indeed in every conceivable way in which the information can be helpful, our arsenals co-operate to secure it and put it to use.

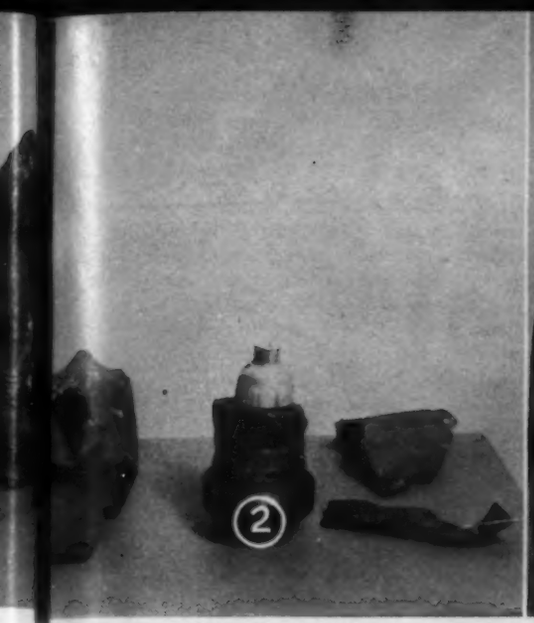
Perhaps the most spectacular surprise sprung upon us by the Germans in this war was the magnetic mine for which, fortunately, a defense was quickly found. But there have been many historical illustrations of comparable surprises, from the days of the Trojan horse onward, where the end, for the less resourceful and suspicious, has been less happy. Normally, however, science and invention tend to play an evolutionary part, modifying weapons and introducing changes in protection and modes of movement. Neither Napoleon nor Hitler, for example, owes his military successes to new weapons but to the effective tactical employment of those which foresight and preparedness had provided against "the day".

We, of course, do not wait for surprises to be sprung on us. When the story of our own efforts finally can be told, as doubtless it eventually will, United States Army Ordnance initiative will prove to have been a potent factor in our ultimate triumph over our enemies. This much may, perhaps, be said at this time, that our aerial success against the Japanese in the Pacific is due to a great extent to the superiority of our ordnance. We have been knocking their planes out of the sky at the rate of five of theirs to one of ours.

In an excellent article on the subject of "Enemy Weapons" published in the July-August issue of *Army Ordnance*, Colonel Scott B. Ritchie has this to say:

"Today on all battle fronts, American ordnance is being tested in deadly combat against the greatest array of enemies to oppose us in all history. They are armed with weapons which are the products of years of planning and building and the best that their mobilized scientific talent could devise. Nor are they standing still, for they realize that they are now in desperate competition wherein, other things being equal, the nation which leads in design and production of the most deadly weapons will surely win.

"Our enemies are shrewd and able. We may be certain that they are doing everything in their power to develop new weapons, to spring surprises, and to improve the effectiveness of their existing equipment. This competition is as real and significant as that on the battle-



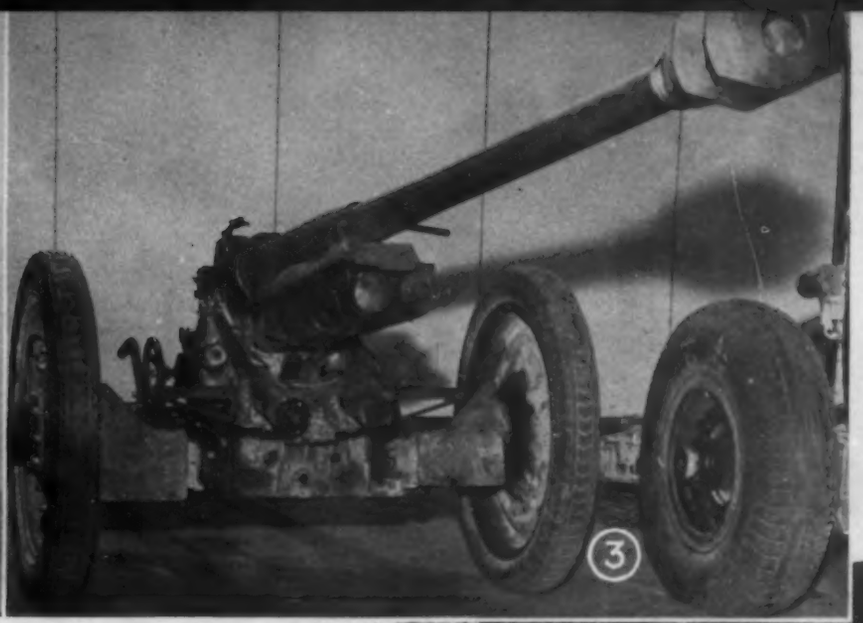


Fig. 1—Mobile German 88-millimeter gun, clever use of which upset British Eighth Army in early stages of Libyan battle

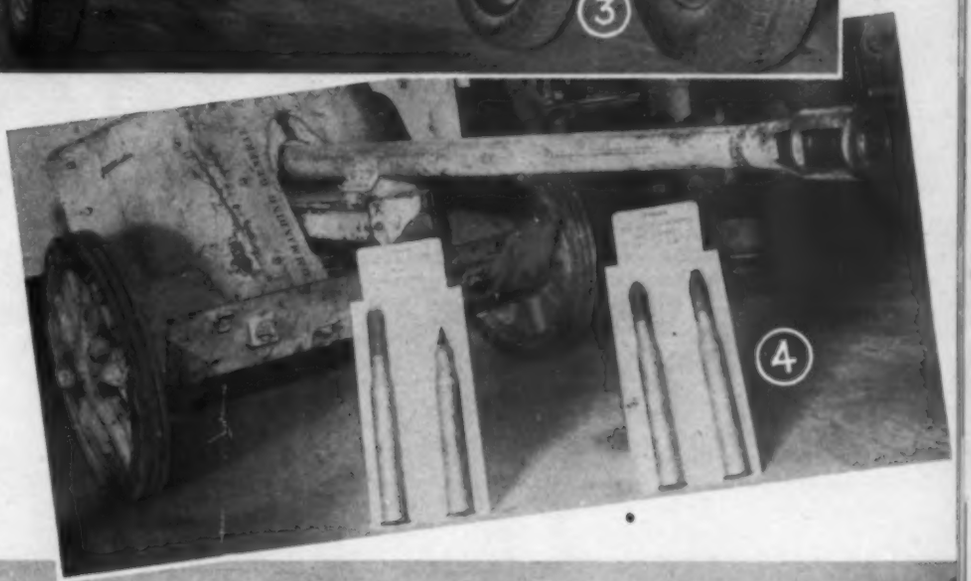
Fig. 2—Poor fragmentation of German 75-millimeter armor-piercing shell is evidenced here by longitudinal crack in piece third from left

Fig. 3—This 76.2-millimeter Russian anti-tank gun was captured by Germans, modified slightly and mounted on ex-Czech light tank chassis and then used as tank hunter

Fig. 4—German 50-millimeter anti-tank gun with ammunition

Fig. 5 — German 7.92-millimeter anti-tank rifle fires bullet with tungsten carbide core to pierce armor, followed by tear-gas pellet to disable crew

Fig. 6—Unusual gun, German Gerlich, has bore tapering from breech to muzzle, giving high muzzle velocity to projectile. Poor ballistic qualities of projectile, however, act to nullify this advantage at ranges beyond a few hundred yards



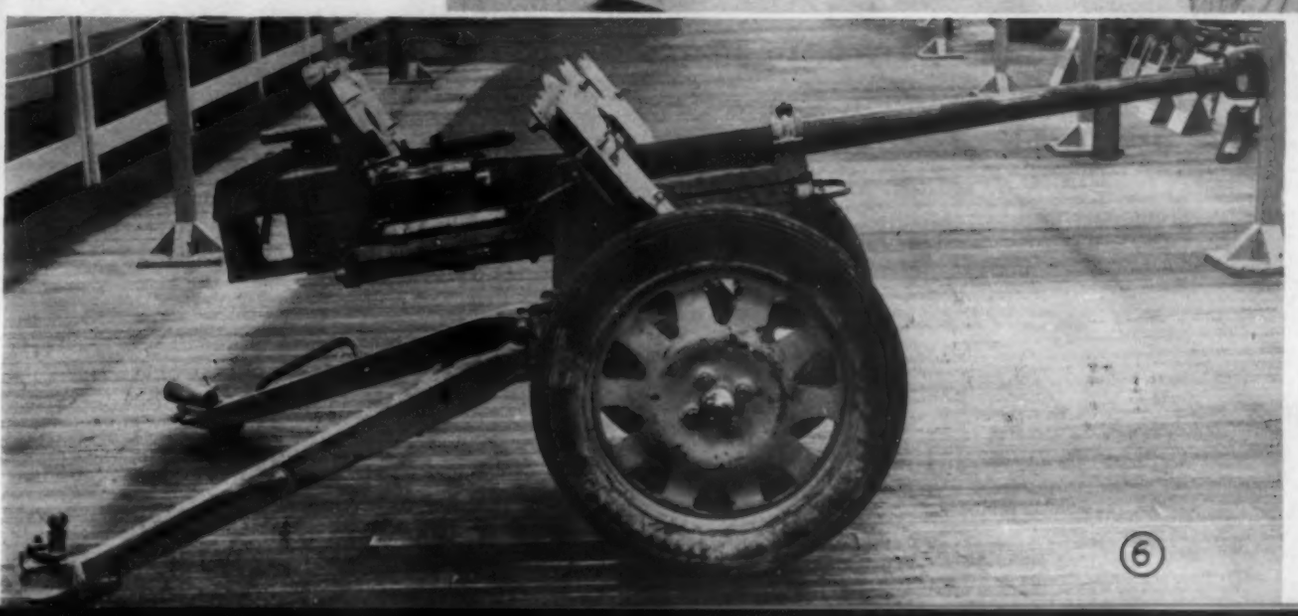


Fig. 7—Italian Colt heavy machine gun was made in the United States. It is a modified 1915 model

field, for on the performance and dependability of weapons rest the lives of soldiers and the outcome of the conflict. On our part this competition is intimately extended from the Office of the Chief of Ordnance in Washington to every theater of war. It is absolutely vital for us to maintain our lead in the fighting tools the Ordnance Department is providing for our armed forces."

In practice, the organization responsible for obtaining and utilizing detailed engineering information on enemy ordnance, which helps us to maintain our superiority includes (1) a small unit in the Service Branch, Technical Division, Office of the Chief of Ordnance, to supervise and co-ordinate the project as a whole; (2) an organization at Aberdeen Proving Center to receive, catalog and examine the foreign *materiel* for that purpose; (3) field agencies to collect and ship *materiel* from the battlefields to Aberdeen; and (4) various governmental, commercial and private research organizations to make engineering tests and analyses.

Immediately on receipt of any item, Colonel Ritchie further explains, a report is made to the co-ordinating unit, known officially as the Ordnance Intelligence Unit, together with recommendations for test and study. This program having been co-ordinated with the development branches of the Technical Division and others in the Office of the Chief of Ordnance, the programs are cleared and directives issued for the tests. These include road tests for automotive equipment; firing tests for guns and ammunition to determine ranges, muzzle velocities, penetration of armor etc.; detailed analyses and tests of fuels and lubricants, propellants and high explosives; and the strength, composition and mode of manufacture of metallic parts. Some of this work can be carried out wholly at Aberdeen, but Watertown Arsenal (ferrous metallurgy); Frankford Arsenal (nonferrous metallurgy and fire-control instruments); Picatinny Arsenal (propellants and explosives); and Rock Island Arsenal (fuels and lubricants) cooperate in their respective fields.

An interesting phase of this effort is the "detective" work being done by Division 18 of the N.D.R.C. (through the War Metallurgy Committee of the National Research Council) which aims at uncovering hidden processes of manufacture which may be helpful to our industry, disclosing changes and defects in manufacturing procedures, bottlenecks and shortages in enemy industry. These examinations are of particular interest to the Office of Strategic Services and to the Board of Economic Warfare. In general, the material examined at Aberdeen not only helps us improve our own ordnance, but gives evidence of basic trends in the design of enemy ordnance which serve as a guide for our future design policies. Further we are able to uncover weaknesses in enemy equipment and, not only teach our own men how to use it, should occasion arise, but also how to destroy it.

Commenting on the highly mobile, powerful 88-millimeter German antitank gun shown in Fig. 1, clever use of which upset the British Eighth Army in the early stages of the Libyan battle, Colonel Ritchie says: "This famous weapon has long been known to our ordnance officers and has been completely proof fired and otherwise examined at Aberdeen. Originally designed for antiaircraft missions, it has been used

Fig. 8—Jap imitations of British Lewis .303-caliber machine gun (upper) and of the British Vickers aircraft type machine gun

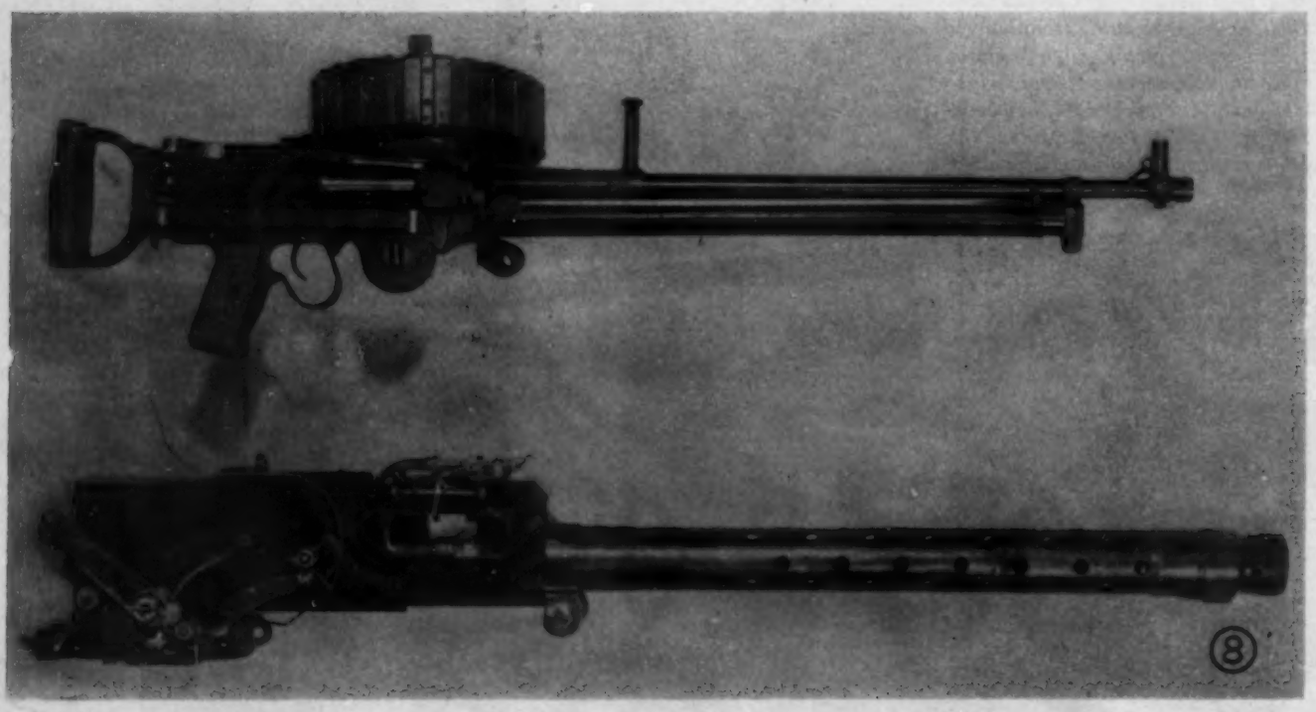


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Fig. 9—Jap "knee" mortar is used to fire 50-millimeter grenades, one of which is shown. All photos taken for STEEL *by C. U. Holbrook, Buckingham Studios, Washington*

extensively by the Germans in Africa as an anti-tank gun when supplied with armor-piercing ammunition. Like several of our weapons of comparable size and superior performance, it is effective against tanks, especially when used in ambush at relatively short ranges. An interesting, although not new, feature is the construction of the liner of this gun in three separate sections."

Although somewhat over-rated, this weapon gives characteristic evidence, in every line and detail, of German thoroughness and engineering ability.

The piece shown in Fig. 3 was recently captured in Libya. It is a 76.2-millimeter Russian antitank gun, captured by the Germans in Russia and transported to Africa for use against the British. When many of these guns fell to the Germans during the early advance into Russia, they were mounted on ex-Czech light tank chassis, to be used as tank hunters. The only modification in this particular weapon has been a rechambering operation, thereby increasing the volume and substantially advancing muzzle velocity.

Much ammunition for these guns also was captured during the annihilation of the Russian armies that bore the brunt of the initial "blitz". Both Russian and German artillery often employ the muzzle brake, Fig. 3, to diminish the force of recoil.

The German 50-millimeter anti-tank gun shown in Fig. 4 also is fitted with a muzzle brake. As the shell passes through the brake, the expanding gases are deflected sidewise to reduce the force of recoil.

Four types of ammunition also are exhibited in Fig. 4; namely, high-explosive (extreme left) for use against personnel in case opportunity offers; "arrow-head" with tungsten-carbide core and aluminum-alloy windshield, shown second from the left; third is an uncapped armor-piercing shell; fourth the same unit with a cap. The tungsten carbide head appears to be able successfully to defeat both homogeneous and hard-faced plate, especially at high velocities. It seems to be favored by the Germans for this purpose. Where, one might inquire, are the Germans getting all this tungsten except from a large stockpile prepared against "der tag", for the world's principal supplies of these ores originate in China, Burma, Japan, Australia, Bolivia and here in the United States?

Cap Has Several Functions

The function of the cap seen in the round on the extreme right, Fig. 4, is to break down the initial strength of the plate. Too, it helps produce an "anti-skid" effect at angles of impact where a ricochet would be highly likely if the cap were not used. The cap also provides powerful circumferential support to the nose of the projectile during the early stages of the piercing operation. Former practice, at least in the case of naval shell, was to make the cap from the same type steel as the shell body but using a somewhat lower alloy content. Thus the cap, after heat treatment, was somewhat less hard than the nose of the shell; but an opposite arrangement seems to serve some of the purposes of land fighting.

Poor fragmentation of German 75-millimeter armor-piercing shell is revealed in Fig. 2. The round at the left has not been fired, but probably caught in an explosion. The cap at the extreme left plays an important part in the armor-punching action of the shell by bruising the plate and serving to protect the point of the shell proper. The other items have been through Allied armor. The second from the left looks as though it had cracked on the way through, giving rise to a low order detonation. The part to the right is the base element which contains the fuze. A booster container has been set up on it.

For greatest effectiveness, high-explosive armor-piercing shell should break up into the largest number of killing fragments. Fragmentation, however, in the case of a shell *designed to explode in a confined space*, is of less importance than in the case of a high-explosive shell designed for personnel attack in the open.

The German Pg. B 39 in Fig. 5 is a 7.92-millimeter anti-tank rifle, fitted with compensator (i.e. muzzle brake) and ammunition holder. The gun has a vertical drop-type breech, operated by hand grip as shown. Bullet fired by this weapon has a gold-painted tungsten-carbide core to do the piercing. Immediately behind this is a tear-gas pellet intended to follow through behind the armor-piercing core and put the crew of the enemy tank out of action.

In Fig. 6 is the German Gerlich, reducing bore, anti-tank gun, about which there has been so much curiosity. The rifled barrel has a diameter at the breech end of 2.8 centimeters and tapers uniformly to 2.0 centimeters at the muzzle. This gives a reduction in area of nearly two to one, thus tending to maintain barrel pressure and so increase muzzle velocity—which is quite high, exceeding 4000 feet per second.

High impact velocities produce some queer results, such familiar examples as straws driven into boards by high velocity winds being cases in point. At high remaining velocities, the tungsten-carbide core of the Gerlich bullet may pierce homogeneous, and even face-hardened, armor plate without breaking up. Although very hard, tungsten carbide as compared with heat-treated alloy steel, is relatively brittle. Usually the core breaks into a shower of fine bits during penetration.

But the high muzzle velocity of the Gerlich is attained at the sacrifice of barrel life, these guns being good for no more than 50 rounds. Three or four barrels are normally supplied to troops in the field. The barrel may readily be unlocked from the breech, two knurled bands on the outside of the barrel facilitating this operation.

Bullet Loses Initial Velocity

Colonel Ritchie in his commenting on the effectiveness of this gun, says: "The 'squeezed down' lightweight projectiles fired by this type of weapon have a high muzzle velocity but poor external ballistic properties. Consequently, the bullet loses its higher initial velocity early in flight, and the gun is not any more effective than the standard type of gun at ranges greater than several hundred yards."

Fig. 7 reminds us that Italy was fighting on the side of the Allies in the last war, for it is an Italian Colt heavy machine gun, modified 1915, manufactured in the United States by Colt's for the Italian government and picked up in Bardia last year.

The Japs are notorious imitators. Fig. 8 shows two items taken in the Solomons —a copy of a British Lewis, caliber .303; and a reproduction of the British Vickers aircraft machine gun, which was manufactured prior to the more modern Browning.

The Lewis gun is gas-operated weapon, magazine fed and air cooled, the gas cylinder being mounted under the barrel. During firing, the outer part of the magazine is rotated about the central portion, the latter being keyed to the magazine post on top of the gun. The recoil spring is of the clock type, a rack secured to the rear end of the pis-

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ton engaging a gear wheel on the spring axle. The striker post, an integral part of the rack, operates in a cam slot cut in the bolt, thus rotating and locking the bolt on the forward stroke and reversing the operation on return.

The Lewis bolt is circular in cross section for the most part, has four locking lugs near its rear, which engage corresponding lugs in the receiver. The action, in fact, is very similar to that of the bolt in the Springfield rifle.

Speaking of Japanese arms, Colonel Ritchie points out that the Nambu gun, the standard light machine gun of the Japs, is an old-type copy of the French Hotchkiss gas-operated gun. He adds: "Its caliber is small, 6.5-millimeters, 0.256-inch, and its hopper feed, while simplifying the ammunition problem, uses six 5-round rifle clips at a time, and makes for a very slow rate of nre. A newer type of light machine gun, type 96, is a poor Jap copy of the Czech Brno, the father of the British Bren light machine gun. It uses a magazine feed and still clings to the 6.5-millimeter caliber. It is not too effective for this reason."

In Fig. 9 is the Japanese 50-millimeter grenade discharger, nick-named "knee mortar", so called because the base looks as though it were designed to fit on the thigh of a kneeling soldier. (A Marine who tried this broke his leg. The base is meant to rest on the ground.)

The range of this little Nip "trick" is varied by moving the position of the firing pin up and down the barrel with a screw, thus altering the muzzle velocity. This item is trigger fired.

The barrel of this mortar is rifled and it may well be asked how the grenade is introduced from the muzzle. Within the hollow, and separate, base of the grenade is a small explosive charge (actually the old Hotchkiss principle of Civil war days for rifled, muzzle-loading cannon) which is ignited through holes in the base by the propellant charge. This small explosive charge forces the band against the rifling of the barrel on firing. We ourselves use a modification of this principle in the U. S. 4.2-inch chemical mortar.

The German trend toward redesign to obtain economy in scarce materials and critical machine tools is well illustrated by the 1942 model machine gun which is their standard machine gun in the class of our .30-caliber. Unlike the 1934 model which it succeeds, new design utilizes stamping for 98 per cent of the gun, it being designed to involve the bare minimum of machining, according to Colonel Ritchie, who comments, "it shows that the Germans have redesigned in a determined effort to cut down machine-tool hours and other manufacturing costs. Other evidences of this (trend) may be expected in the near future."

Comparing manufacturing processes, Colonel Ritchie explains that while the Germans use welding extensively, it has been found inferior to American welding. That they are not above copying a good American idea for increasing fire-power is evidenced by the recent appearance of a German semiautomatic rifle similar to the American Garand, he adds.

In conclusion, Colonel Ritchie says, "it can be definitely stated that neither Germany, Italy nor Japan has demonstrated any weapons superior in military effectiveness to the best American standard. It seems logical that as the war progresses, the superiority of American ordnance will become more pronounced as the impact of American design and productive ability is brought to bear in greater measure on the enemy."

"FOOTPRINTS" in METAL PARTS

. . . . *indicate distribution and amount of stresses*

A research engineer sprays lacquer coating on a 1600-pound model of a gear tooth in position for pressure test on hydraulic press at Westinghouse Research Laboratories. When lacquer dries, pressure is exerted until the lacquer "skin" cracks. Extent and direction of these cracks afford a progressive record of the tooth's weak points

A SMOOTH LACQUER coating known as Stresscoat, when sprayed on a steel target, records the impact of a speeding bullet by exposing its "footprints"—thin, closely spaced cracks which appear on the surface of the plate. These "footprints" are giving scientists information which may aid in the development of rougher armor steel, and improvements in motors, gears and many other machine parts may also be forthcoming.

Thus, experiments being conducted by Dr. Miklos Hetenyi in the Westinghouse Research Laboratories around the use of this unusual substance may prove invaluable in wartime and later in peace by informing research engineers when they are on the right track in designing new parts. Life tests are still necessary, but the "Achilles' heel" in a metal part can be located in advance.

In a recent test engineers put the lacquer coating on a 1600-pound model of a gear tooth and squeezed the tooth in a large hydraulic press to locate accurately the stresses. Lacquer sprayed on the gear tooth dries in 15 hours to form a tightly clinging but brittle skin about as thick as the diameter of human hair. To determine the slightest strain that will crack the coating, a footlong steel bar is coated at the same time under identical atmospheric conditions. It is then subjected to a bend test. Cracks appearing at the rigidly-held end become less frequent until they disappear entirely at the opposite end, the one which was depressed. A strain scale reading, taken opposite the point where the last crack occurs, tells the minimum strain—the least amount the metal must "stretch" to split the coating.

The coated gear tooth is then subjected to the kind of punishment it would get under working conditions in a machine. It is slowly squeezed in the press, capable of exerting a force of 400,000 pounds, while research workers scan the coating for the first appearance of a crack. With more pressure, the skin splits in other places and finally the laboratory has a progressive list of the tooth's weak points.

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To Put an Aircraft Plant Abreast of Increased Delivery Schedules

SHORTENING the interval between drafting board and assembly line in the production of Thunderbolt fighter planes at Republic Aviation Corp. is a system of lensless photographic reproduction of templates. The photographic method of template making has not not only revolutionized drafting room practice in this war plant but has enabled the company to keep abreast of Army demands for increased deliveries and simplified the problem of supplying subcontractors with accurate standards.

While this method of parts pattern reproduction has been found imperative for tooling-up operations for new model aircraft, it also serves to shorten the time taken for building design changes into production warplanes.

The system, as described by David C. Cooke in the May issue of *Aero Digest*, differs substantially from a former method used by Republic and some other manufacturers. Much time was formerly necessary to scribe from the blueprint a master layout on painted metal, followed by none too accurate drilling of closely spaced small holes through lines of the original. Duplicating was done by marking the under sheet through the holes with a prick punch. The business of making exact duplicates under the new system is now a matter of minutes.

The original layout is made on a sheet of translucent plastic material which has been sprayed with an opaque covering. The layout is executed by scribing through the coating, leaving exposed the clear plastic surface underneath. Thus the master layout is ready for use as a master negative.

Transmission of the layout lines is finished quickly. A vacuum contact printer performs the final operation in copy making. It exerts a pressure of more than 70 tons and has a working surface of 6½ x 10½ feet. Suction apparatus in the head of the printer draws out the air so that the negative and material are in close contact. If there were any separation, the lines on the material would become wider than those of the original. Because of the rubber blanket in the printer's head, it can take material ranging from the lightest gages up to 2 inches in thickness.

When the negative and copy sheet have been put on the tray, shown in Fig. 1, the lid is lowered by an electric control and light rays from 340 incandescent bulbs penetrate the lines of the master layout to expose the sensitized material. Following exposure, the material is processed by developing and fixing in the customary photographic manner. The template is then cut and filed to the lines. In Fig. 2 a worker is seen filing a template which was reproduced from the master negative on the bench before him.

The layout can be transferred to almost any material—aluminum, steel, wood, paper, Masonite and cloth, for example. In every case, the materials are first covered with an emulsion sensitive to light and are then dried and stored in a darkroom.

A typical shop order might consist of the following: One reproduction on 0.05-inch galvanized metal to be used as a master checking template; one on ⅛-inch steel to be used as a routing and checking template; one on 1-inch Masonite for a form block; one on ¼-inch steel for a jig checking template. For one subassembly there might be 12 to 20 reproductions, one each on these various materials.

When a revision is required, lines to be changed are eradicated by brushing them over with the same opaque material, whereupon the loftsman scribes in the revision right on the negative. Previously it was necessary to advise an affected vendor when revisions were made; there would be duplication of work, for his men would have to scribe out a completely new template.

Once the hand-drawn master negative is inspected for accuracy, it can be re-

(*Please turn to Page* 112)

Fig. 1. (Above)—Workers remove a negative from the printer which has maximum working surface of 6½ x 10½ feet. This duplicate, a plastic sheet, carries a complete impression of the master negative on its sensitized surface. Developing and fixing is done in the customary photographic manner.

Fig. 2. (Left)—An employe files a template which was reproduced from the master negative on the bench in front of him. Photos courtesy Aero Digest, *New York*

TURNING OUT MORE BILLETS WITH LESS MEN . . .

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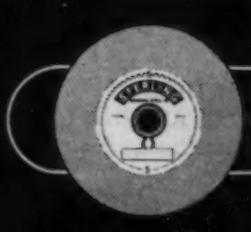
THE SERVICE is drawing from many industries. Today's swing frame grinder operator may be a paratrooper next month! The workman you need most enlists, leaving a vacancy that is difficult to fill. When a new man can be hired, he is often inexperienced and over age, unused to the demands of billet grinding. However, demands of war cannot wait . . ways must be found to accelerate production. Many steel mills have discovered that production can be increased by changing grinding wheels to a type more suited to the demands of the job.

Better grinding wheel specifications are a simple solution to the problem of keeping production up where it belongs. Sterling's "Wheels of Industry" are made to conform to both job and employee demands. When the correct Sterling Grinding Wheel is used, unskilled workers can often turn out more work . . there is less fatigue, billet grinding becomes easier . . faster! Foremen often find fewer men can turn out more work when haphazard grinding practices are replaced by planned methods. That is where the pre-determined specifications of Sterling Grinding Wheels are a big help . . they are built to the demands of your particular job.

Finding the proper wheel to use is easy. A consulation with a Sterling engineer will help you decide the specification best suited to your needs. Sterling engineers have often solved problems of lowered production by recommending wheels built to special specifications. They may be able to help you achieve better results with less men. A letter from you today will start us working on increasing your production wherever grinding wheels are used in your plant. This service costs you nothing . . may mean everything! Ask for it!



• STERLING ABRASIVES •

THE
STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

ENGINEERED SEEING

for the Modern Steel

By WILLIAM H. KAHLER
Westinghouse Electric & Mfg. Co.
Cleveland

LIGHTING in steel mills assumes even greater significance today than ever before because the mills must run day and night to meet the demands for war steel. Many of the old plants have realized the necessity of proper illumination and have replaced their "gloom lights" with illumination designed for easy, comfortable seeing. In new mills such as Henry Kaiser's on the west coast and Columbia Steel Co.'s in the central west, lighting has been carefully engineered according to modern standards.

Two important words in the mills are "production" and "safety". Every department in a mill strives to break previous records and adequate lighting actually is a real "helper" for the workers exerting their energies toward record-breaking goals. When men see better, they work faster with less expenditure of nervous energy.

Steel mill hazards have increased since the beginning of war production in spite of the extensive safety programs carried out in every plant. For example, in the state of Illinois*, 22 per cent of all manufacturing accidents occurred in the iron and steel industry in 1941. Over 50 per cent of these accidents were attributed to the following five causes:

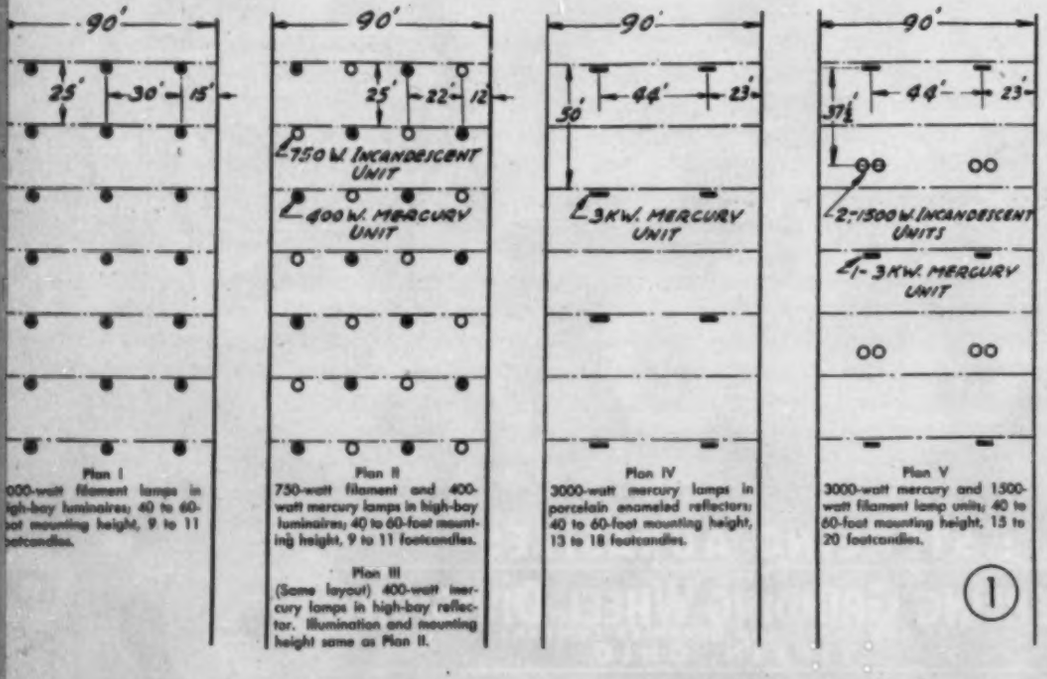
1. Falls.
2. Stepping on, or striking against dangerous objects.
3. Falling objects.
4. Handling material.
5. Handling tools.

Visibility is one of the controlling factors for each of these causes and by better lighting some of these accidents can be prevented.

Steel mill lighting requirements may be summarized as follows:

1. General illumination should be of sufficient intensity to permit quick, accurate perception of all visual tasks. Recommended minimum levels of illumination for the major interior areas in steel mills are listed in the accompanying table. These footcandle values are based on current good practice and can be obtained economically with present-day lighting equipment. In many instances higher levels can be used with greater benefit, particularly when the quality of product depends upon visual operations. For example, in the inspection of steel sheet, plate and billets, contrast is poor, but higher illumination will improve the apparent contrast. Therefore, the highest practical intensity should be provided for these critical seeing tasks.
2. Distribution of light should be uniform. Spotty lighting causes eye strain and poor visibility.
3. Direct and reflected glare in the normal fields of vision must be avoided because they interfere with clear vision and cause nervous fatigue. Direct glare is the worst offender of efficient seeing, but can be easily prevented by selecting proper luminaires. Reflected glare is most annoying where shiny steel is in process. Therefore, extreme care must be exercised in designing the lighting for such locations to prevent these specular reflections.

*Report on Industrial Accidents for Illinois, 1942.



Plan I
000-watt filament lamps in igh-bay luminaires; 40 to 60- ot mounting height, 9 to 11 ootcandles.

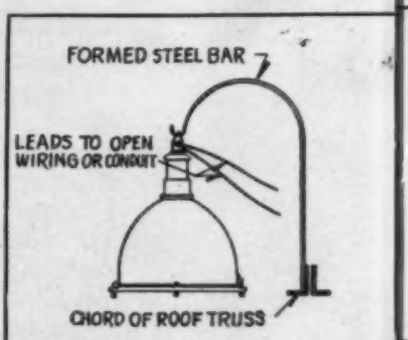
Plan II
750-watt filament and 400-watt mercury lamps in high-bay luminaires; 40 to 60-foot mounting height, 9 to 11 footcandles.

Plan III
(Same layout) 400-watt mercury lamps in high-bay reflector. Illumination and mounting height same as Plan II.

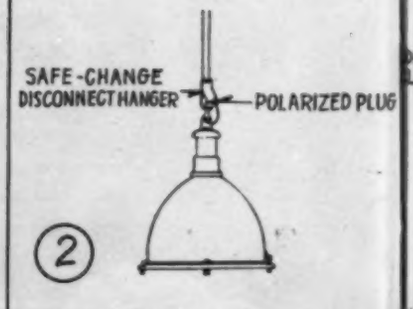
Plan IV
3000-watt mercury lamps in porcelain enameled reflectors; 40 to 60-foot mounting height, 13 to 18 footcandles.

Plan V
3000-watt mercury and 1500-watt filament lamp units; 40 to 60-foot mounting height, 15 to 20 footcandles.

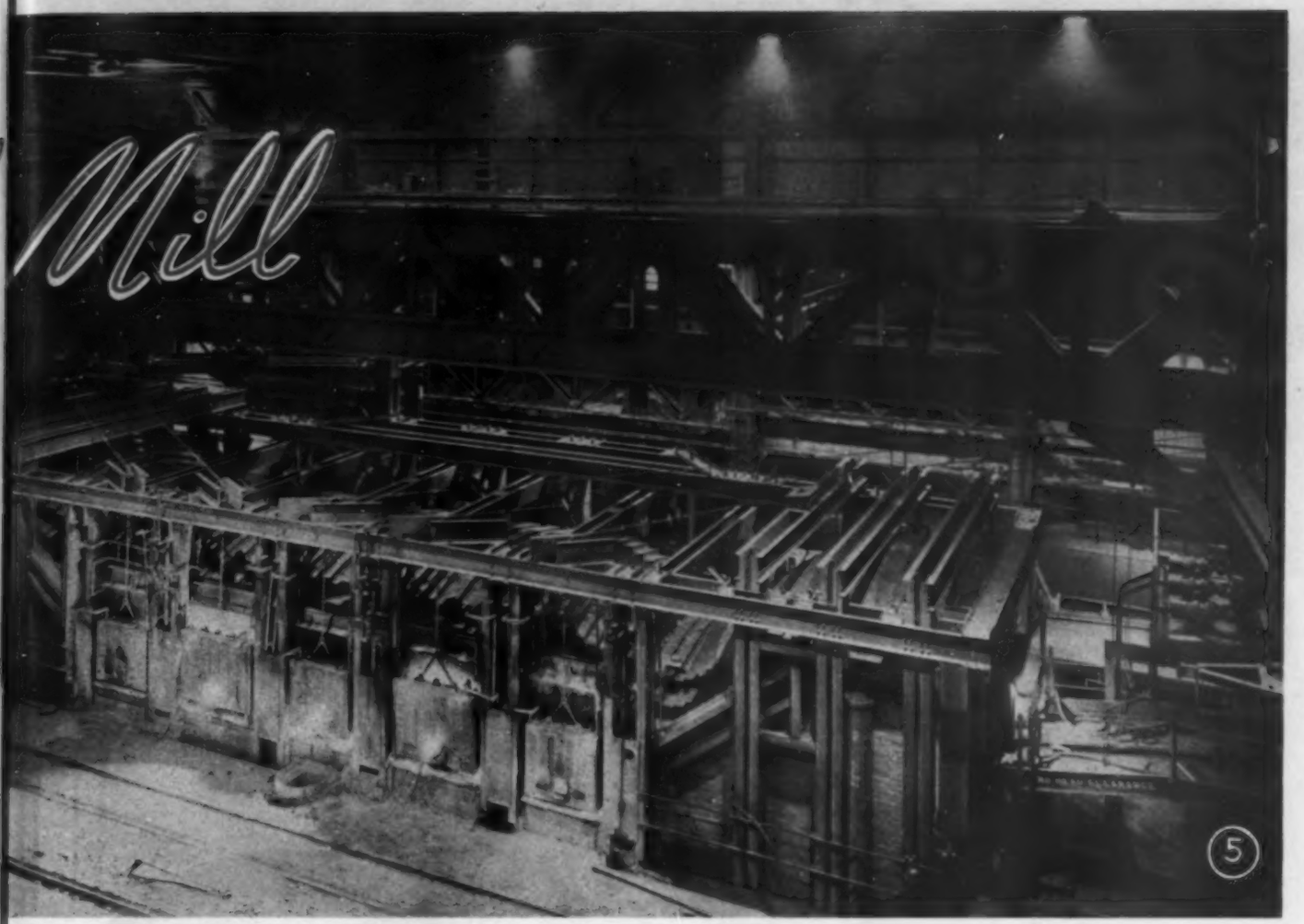
(1)



METHOD 'A'
"SHEPHERD'S CROOK" MOUNTING



METHOD 'C'
HOOK AND PLUG DISCONNECT



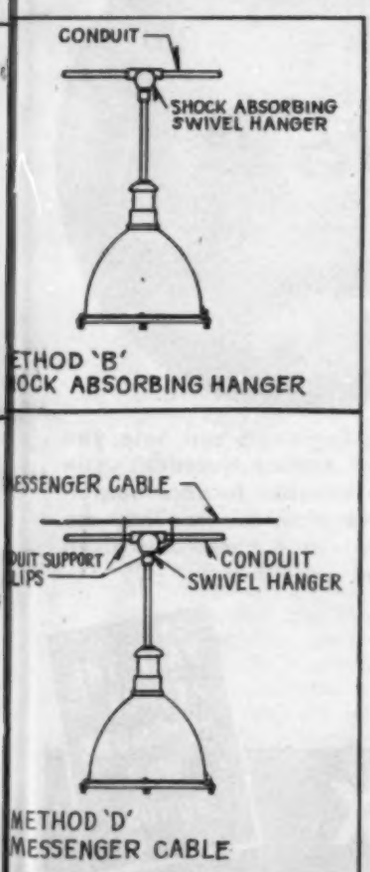


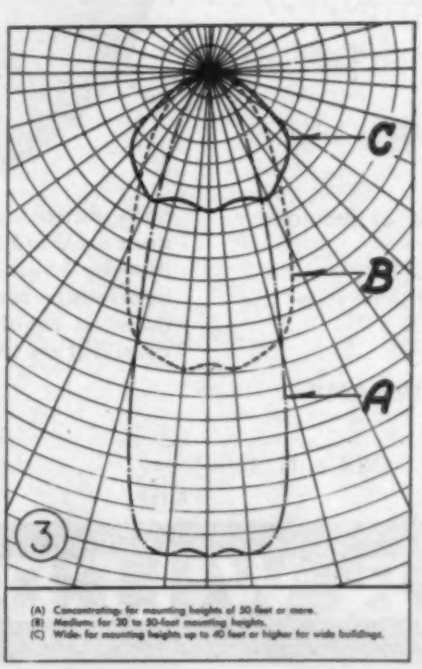
Fig. 1—Typical lighting layouts for steel mill buildings

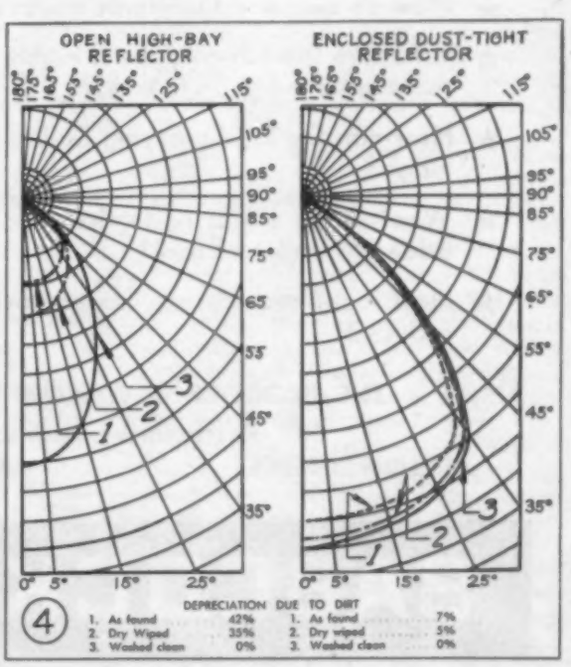
Fig. 2—Methods of mounting luminaires in steel mills

Fig. 3—Characteristic reflector distribution curves for steel mill luminaires

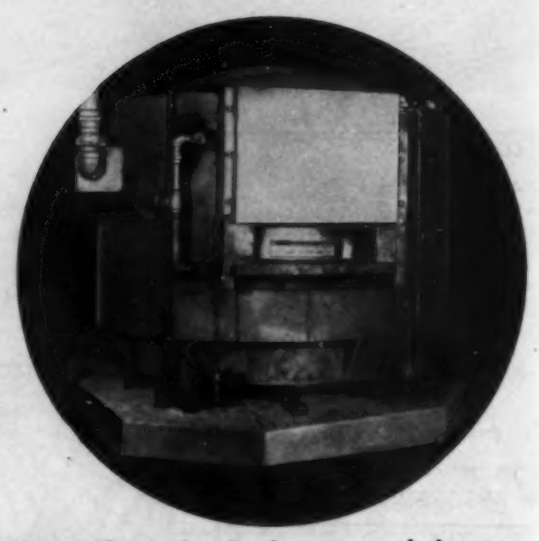
Fig. 4—Dirt depreciation curves

Fig. 5—Open-hearth area, Jones & Laughlin Steel Corp., Pittsburgh, illuminated by enclosed dust-tight high-bay luminaires with concentrating reflectors


C
B
A
3
(A) Concentrating, for mounting heights of 50 feet or more.
(B) Medium, for 30 to 50-foot mounting heights.
(C) Wide, for mounting heights up to 40 feet or higher for wide buildings.



- ★ How can spalling be reduced?
- ★ What is the best face coating to prevent slag effect on walls and floors?
- ★ What are the methods and materials used for deep patching?
- ★ How can shallow patching be done?
- ★ How do burner adjustments affect refractory life?
- ★ What are the advantages of highly bonded and air-seal cushioned joints in walls?
- ★ How can the load-carrying ability of floor brick be judged?
- ★ What is the effect upon firebrick life of insulation added to walls and roof?
- ★ How can heat-losses through structural steel be reduced?



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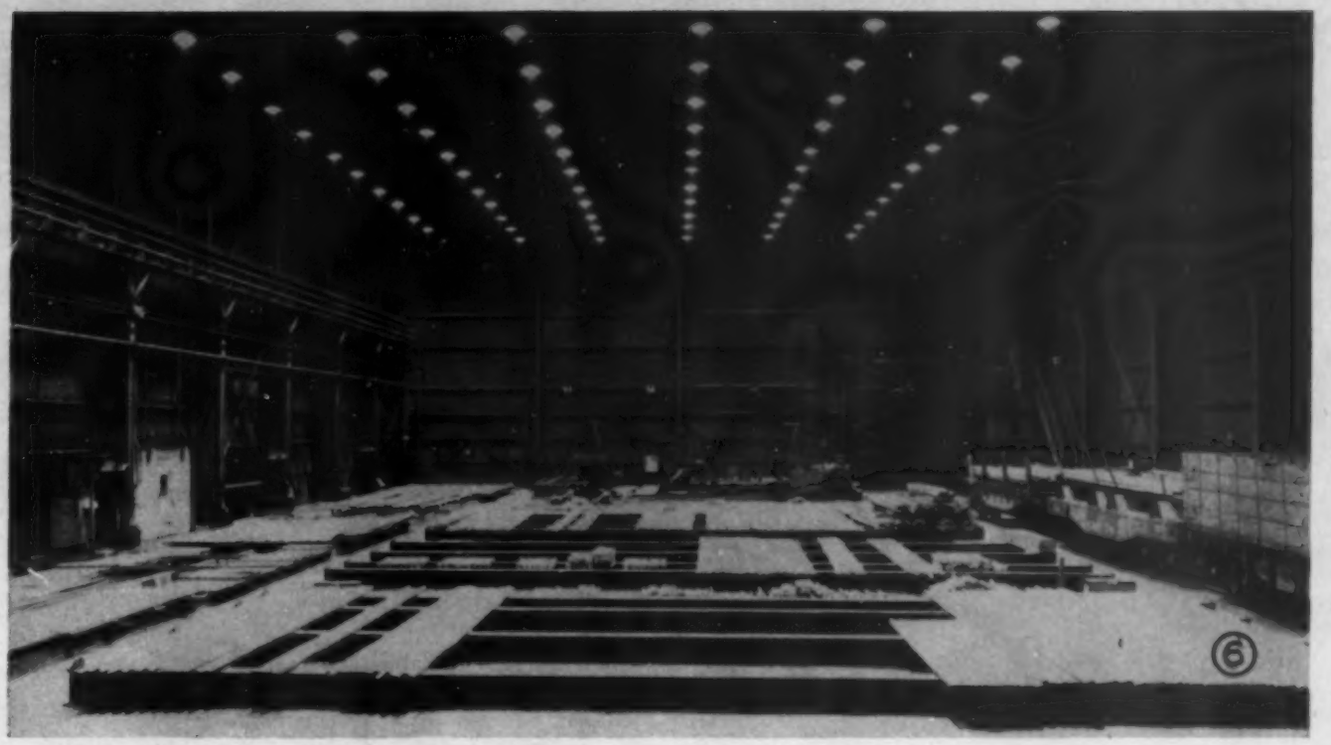


Fig. 6—Chipping area, Carnegie-Illinois Steel Corp., Gary, Ind. Millite luminaires, 1000 watt each, mounted 38 feet high provide about 25 footcandles

4. In certain locations it is impractical to furnish sufficient illumination at the point of work by general lighting. Supplementary lighting, therefore, should be used in addition to the general lighting system to direct the proper quantity and quality of illumination to the work. This supplementary equipment should be permanently installed as portable hand lights hinder production and require constant maintenance.

Most steel plant buildings have a truss height of over 20 feet, so they are treated as high-bay lighting applications. The two light sources available for high-bay illumination are filament and mercury lamps which are used in high-bay luminaires.

Filament lamps may be operated from alternating or direct current, produce suitable color quality and represent a relatively low initial investment. They are best suited to utilization voltages in the order of 120 and their average rated life is 1000 hours.

The mercury lamp is available in two sizes for high-bay lighting, 400 watt and 3000 watt. These sources are twice as efficient as large filament lamps, have a much longer life (3000 hours for the former and 2000 hours for the latter) and are more resistant to vibration. Mercury lamps must be operated from special ballasts which provide proper starting voltage and limit the operating current. Thus, they are only suitable for 50 or 60-cycle alternating-current systems. The ballasts are available in one or two lamp sizes and for several different distribution voltages. Standard voltage for 400-watt ballasts are 115 and 230 volts while the 3000-watt ballasts may be had either with 230 or 460-volt primaries. The higher voltage units are recommended to minimize the copper required for the system of distribution.

The mercury lamp requires several minutes to come-up to full intensity and in case of a power interruption, a short time will elapse before the lamp restarts.

Several recommended layouts for filament and mercury lamp equipment are illustrated in Fig. 1. These layout arrangements can be applied to most any high-bay area by adjusting the spacing to fit specific conditions.

Plan I is the simplest form of layout using all filament lamps. It represents the lowest initial cost, but requires more watts per footcandle.

Plan II combines the advantages of both filament and mercury lamps. Note, luminaires are staggered to obtain a satisfactory color mix from the two sources. The 750-watt filament lamp is best for this combination layout because its light output approximately equals that of the 400-watt mercury lamp. The combination assimilates a daylight effect which is particularly acceptable for industrial work. In case of a momentary power interruption, which allows the mercury lamps to go out, the filament lamps relight immediately when power is restored and an extended period of "black-out" is prevented.

Plan III uses only 400-watt mercury lamps on the same spacing as Plan II and the footcandles obtained will be equivalent. For most installations straight mercury lighting is the most economical on an overall cost of light basis and is recommended for plants where voltage is stable and color of light is unimportant.

Plans IV and V are relatively new because the 3-kilowatt mercury lamp has only been available a short time. This new source emits the same amount of light as seven and one-half 400-watt mercury lamps or nearly six 1000-watt filament lamps. Therefore, relatively few 3-kilowatt luminaires are required and desired higher intensities can be provided with a minimum number of units. Thus maintenance is considerably reduced.

Plan IV uses all 3000-watt mercury luminaires and Plan V is a combination system using 3000-watt mercury units and 1500-watt high bay reflectors.

The 3-kilowatt mercury lamp is an extremely bright source and must be well shielded by the reflector to prevent direct glare. The mounting height for this source should be at least 40 feet. This lamp does not start readily in cold surroundings, so it should not be used where the ambient may go below 32 degrees Fahr.

The 3-kilowatt lamp is now being used successfully in several high-bay installations and it should be given serious consideration for new lighting in steel mills and foundries. Where high intensities are required such as for chipping, bar inspection, grinding and plate inspection, these units are particularly applicable. At one of the new western steel mills, 3-kilowatt mercury lighting will furnish approximately 50 footcandles in the slab conditioning area.

Steel mills are truly in the heavy industry classification and lighting equipment must be selected to meet severe heavy duty requirements. Rough treatment, severe vibrations, high ambient temperatures and plenty of dirt are the conditions that confront lighting equipment in a typical mill.

It is not always possible to employ high-class maintenance labor, so lumin-

aires should be a type requiring the simplest forms of servicing operations. The necessity for using any tools for relamping or cleaning a reflector should be eliminated.

The constant operation of heavy cranes creates vibrations and jars that only heavy-duty equipment will withstand. These vibrations may effect the life of filament lamps, so some form of shock absorber should be used in filament lamp luminaires or in the supporting means.

Ambient temperatures exceeding 50 degrees Cent. will be found in some parts of the mill such as over open-hearth furnaces, arc furnaces, ovens or heat treating areas. Therefore, lighting units must be designed to stand these conditions without failure. All luminaires should be wired with conductors having heat resisting insulation. Special care should be taken to locate transformers where ambient temperature will not exceed 40 degrees Cent. during continuous operation.

Dirt a'plenty is found in all parts of the mill. Soot from locomotives and furnaces; oily dust in cold strip mills, dry dust in wire drawing departments, steam and scale in hot strip mills create an extreme dirt-laden atmosphere. This filth collects on lamps and reflectors and soon the lighting efficiency drops as much as 60 per cent. This condition is a challenge to the lighting engineer. Experience has proved that rugged, dust-tight luminaires will ward off a great deal of this dirt accumulation.

Comparison of Reflectors

Actual in-service tests (Fig. 4) show the difference in performance between open and dust-tight reflectors. Note that dirt accumulation on the open reflector had two effects. First, it reduced the efficiency 42 per cent and second, it changed the distribution from concentrating to wide spread because the dirt "diffused" the reflecting surface. Due to loss of light output and light control, the illumination was reduced 50 per cent in the area from which this reflector was removed.

In contrast, study the curve on the right which was taken on a dust-tight unit removed from service in a foundry. Note that overall efficiency was only reduced a few per cent by dirt on the cover lens and distribution was not changed at all.

Safety Consideration: Lighting equipment must be designed and installed with safety in mind as a prime factor. Therefore, dust-tight covers should be heat-tempered plate glass to resist shock and vibration as well as high temperatures. Also, units should be carefully supported to eliminate the possibility of a falling unit.

Reflectors with Correct Light Distribution—Three characteristic reflector distributions are used in steel mills; (A) Concentrating, (B) Medium and (C) Wide, as illustrated in Fig. 3. Correct selection necessitates a knowledge of mounting height and spacing of outlets as well as consideration of the ratio of vertical to horizontal illumination required. If the visual tasks are all in a near horizontal plane, the vertical to horizontal ratio may be low, but if many tasks are in vertical planes, the highest possible vertical ratio should be provided to insure maximum vertical visibility.

Concentrating distributions are only recommended for mounting 50 feet or more above the floor. To insure uniform horizontal illumination, the spacing should not be more than 40 per cent of the mounting height. A low vertical to horizontal ratio results from concentrating units.

Medium distributions are applicable to many steel mill areas because they are suitable for mounting heights of 30 to 50 feet. Spacing should not be more than 80 per cent of the mounting height. The vertical to horizontal ratio will be higher than with concentrating equipment.

RECOMMENDED MINIMUM LEVELS FOR INTERIOR ILLUMINATION OF STEEL MILLS

(Footcandle Values Represent Order of Magnitude Rather than Exact Illuminations.)

Location	Minimum footcandles in service
Billet, blooming, sheet bar, skelp and slabbing mills	10
Boiler room, coal handling, furnaces	5
Cold strip, pipe, rail, rod, tube universal plate and wire drawing	10*
Hot sheet and hot strip mills	10*
Instrument panels, control rooms	30
Inspection:	
Black plate	50
Bloom and billet chipping, slab conditioning	50
Tin plate, galvanized sheet, stainless	50**
Laboratory	30
Merchant and sheared plate mills	20*
Motor room	20
Storage—rough, bulky material	5
Tin plate mills:	
Hot strip rolling and tinning	10
Cold strip rolling	20

For other types of work areas refer to "American Recommended Practice of Industrial Lighting," 1942, published by the Illuminating Engineering Society.

*In these areas the machines require one or more supplementary lighting units to effectively direct light toward the point where maximum visibility is required.

**A large area, low brightness luminaire is recommended.

Wide distribution reflectors may be installed up to 40-foot mounting height in most mill buildings and even higher in wide, open areas. The spacing never should exceed the mounting height for uniform coverage lighting. This distribution provides the highest vertical-horizontal ratio, and shadows are less than with the other two distributions. Therefore, wide distribution reflectors are recommended for areas where vertical footcandles are important.

The best method of supporting the luminaires depends upon the layout, type of equipment used, building structure and wiring method. Fig. 2 shows four reflector suspensions that are in use in various mills. Method A is used by several eastern mills and has been found to be highly acceptable inasmuch as the steel "shepherd's crook" is easily formed from a steel bar and serves as an excellent shock absorber. The bar can be welded or bolted to the roof truss chord.

When reflectors are to be suspended directly from the conduit system, a shock absorbing swivel condulet is suggested as in method B.

Method C is being used by one of the new west coast mills and it simplifies maintenance because the luminaire can be removed from service. By removing the polarized plug, the complete unit can be lowered for thorough servicing.

Method D is similar to B, except that the conduit system is supported by messenger cable. This scheme is used where it is not convenient to hang units on the trusses or roof purlins. The cable must be anchored firmly at each end and should be supported by ¼-inch rods or wires every 12 to 15 feet to prevent sagging. Since the cable will tend to dampen out vibrations, the swivel condulet does not have to be the shock absorbing type.

All lighting equipment requires servicing and regular maintenance must be practiced, or illumination levels may drop 50 per cent or more below the designed levels. To accomplish this servicing efficiently on a sound economic basis, all lighting units must be easily accessible. This means that maintenance access should be planned when the lighting is designed.

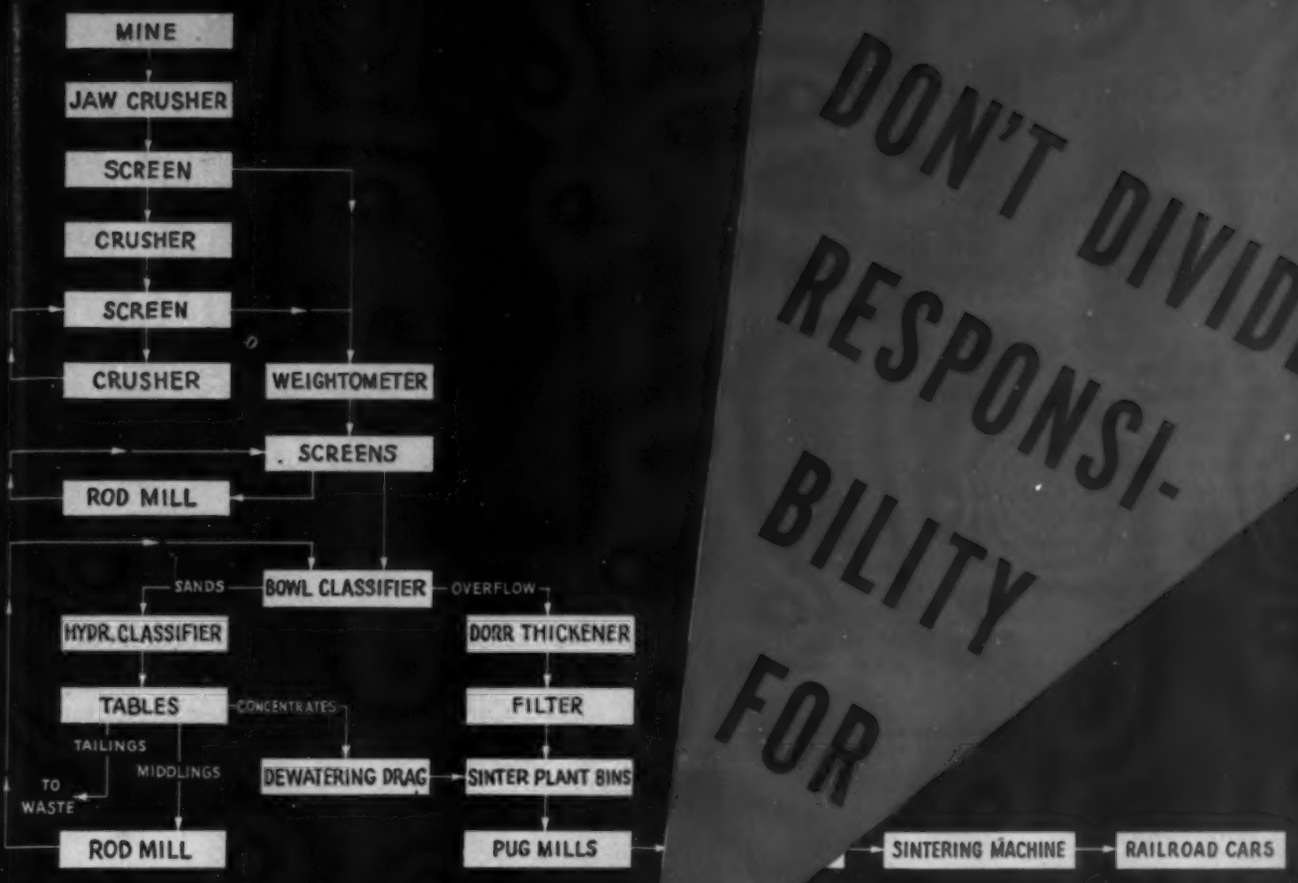
Source of Convenience

Generally, in a steel mill, the cranes are the most convenient method of access. It is important to make certain that units can be reached from the crane catwalk or, as with large cranes, to provide a platform on top of the crane carriage. Also, it is essential to make sure that all luminaires can be reached from the crane.

In areas where there are no cranes from which lighting can be serviced, the reflectors should be mounted on lowering hangers. Thus, by chain or cable run from each hanger to a convenient point along the columns, the luminaires can be lowered to the floor for servicing.

When the mounting height is less than 18 feet step ladder access is satisfactory.

After analyzing the visual and mechanical requirements, it is self-evident that a steel mill cannot be effectively illuminated by "just hanging up a few lights here and there." Many engineering problems are involved including, (1) selection of the lighting levels; (2) choice of suitable luminaires, layout and distribution system; and (3) consideration of the best maintenance method. By thoroughly studying all of these ramifications when the lighting is designed, it is possible to provide an optimum illumination system that is economical, permanent and easy to maintain. Seeing conditions engineered for maximum visibility and safety will not only contribute to maximum production and product quality, but will also lead to a cleaner, healthier plant and improved worker-employer relations.



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How To Charge Flashlight Cells

RECHARGING flashlight batteries will allow their being re-used from five to ten times. The recharged batteries give a slightly brighter light, and the total burning hours per charge compares favorably with new batteries. From records of the past 8 months, battery replacement cost has been reduced 70 per cent or $1400 per year, with a corresponding reduction in the use of critical materials required for battery construction—thus reads part of a report Shell Oil Co. recently revealed to the Petroleum Administration for War, Washington, following the development of a method of recharging batteries.

Testing of the simple apparatus used in recharging of the batteries, which proved feasible and economical, was conducted at Shell's Martinez Refinery.

According to the report, past refinery use of unit flashlight batteries was about 30,000 per year, with an additional 1000 per year of the 6-volt type used in hand lanterns. At a cost of $0.0566 per cell, and $0.335 for each 6-volt unit, battery cost for the refinery was approximately $2000 per year.

After discovering that recharging of batteries was feasible, provided the zinc casing was intact, local testing was started to determine the optimum recharging voltage, time to recharge, service life of the recharged battery and the average number of rechargings possible before the battery failed. As a source of 125-volt direct current was available from synchronous motor exciters adjacent to the electric shop, all tests were conducted at this location.

The total number of times each battery can be recharged seems to depend primarily upon the speed with which the battery is discharged, according to Shell. New batteries which are discharged in a few nights' use can be recharged within the next week and this cycle can be repeated five to ten times before failure of the battery results. Conversely, batteries which are discharged over a long period may only take one or two recharges before failure results. A battery is considered as having failed when the zinc casing is corroded through.

It was noted that recharged batteries lose their charge if placed in storage for any considerable period, it being necessary to use them within a week or two of recharging. Therefore no attempt is made to utilize recharged units on intermittent service, such as the "emergency lights" which are kept at various locations for use in emergencies only.

The distribution of flashlight batteries at Martinez Refinery was usually handled by the shift electrician, partly for control purposes. Operators requiring a battery charge are furnished replacement batteries upon surrender of the old batteries. Therefore, the existing setup was ideal for collecting discharged batteries for recharging. Battery users, naturally, were skeptical when informed they were being supplied with recharged batteries, but in a short time were requesting recharged batteries, as they give a slightly brighter light.

Standard Batteries Used

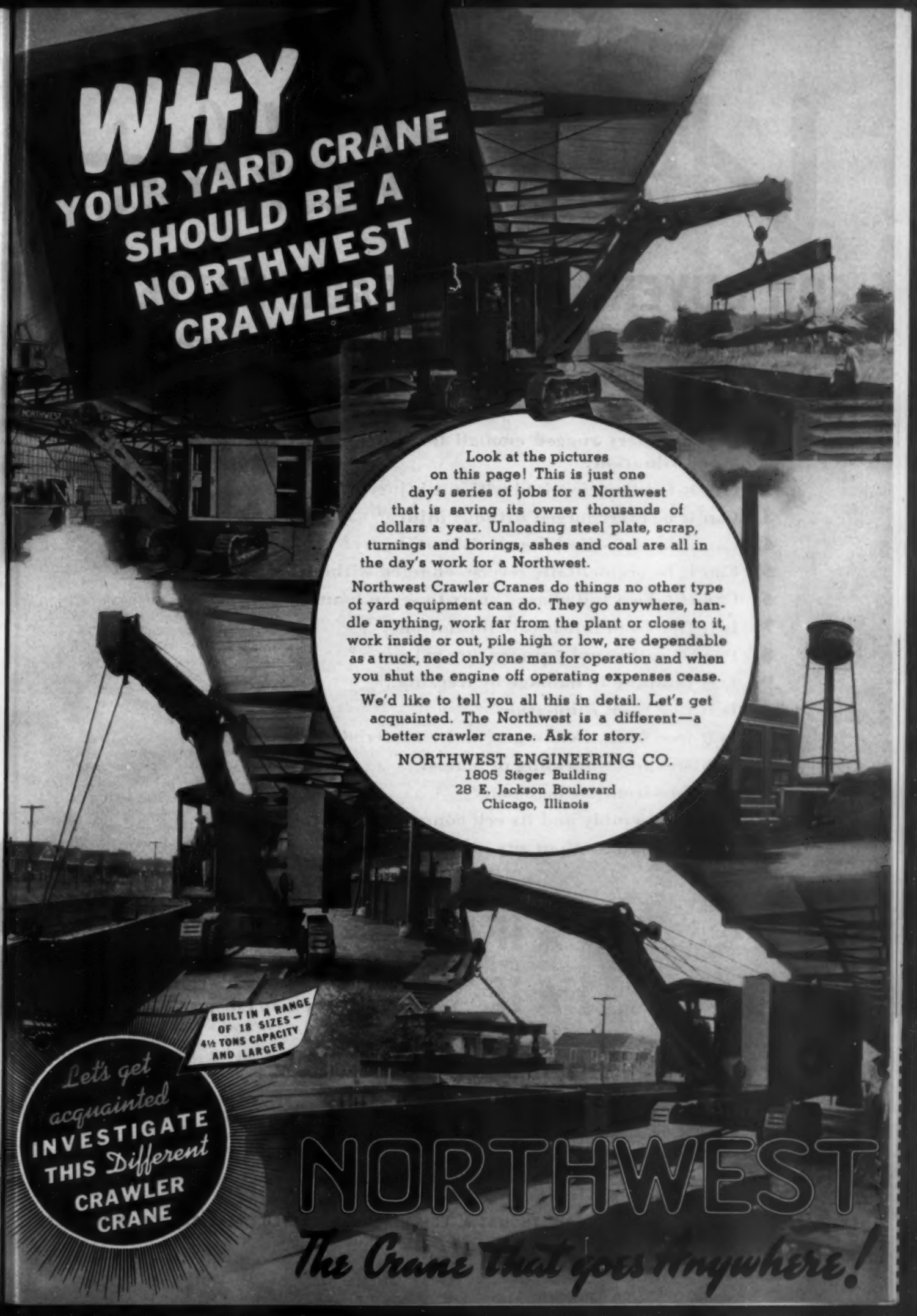
While several makes of unit batteries have been recharged, the standard battery used is the Ray-O-Vac leak-proof heavy duty unit cell No. 21-P size "D". For use in the Burgess No. OL-26 electric hand lanterns, which require a 6-volt unit, either Eveready No. 409 or Burgess No. F4H batteries are used.

Charging setup employed by Shell consists of six battery racks mounted in front of a 25 x ¼ x 20-inch transite backboard. At the top of the backboard are located a ½-inch conduit besides condulets and, directly below this, above the battery racks, is a 5½ x ½ x 22-inch shelf used for recharging 6-volt 4-cell lantern batteries. Connectors, jumpers of 18-gage fixture wire and crocodile clips also are located here. Bottom of the unit consists of a 4-inch square transite lamp house in which 10-watt lamps are used for limiting and indicating flow of current.

The six battery racks for the flashlight cells are located vertically between the housing at the bottom of the unit and the shelf for the lantern cells. Flashlight cells are placed in each of the six battery racks in the same manner as when placing in a flashlight—one on top of the other. The bottom cell in each rack makes contact with a brass screw protruding through the upper wall of the lamp house. Contact at the top of the rack is made by a positive contact follower arranged to slide down a ¼-inch brass rod contacting the top cell in the rack. Current is brought to the unit at one side, passing through the bottom lamphouse and up the other side of the apparatus and across the top of the backboard.

Batteries are kept on charge 16 hours.

TESTING ENEMY "PERSUADERS": Laboratory technicians play an important role in perfecting military ammunition. Above view shows a laboratory assistant at Remington Arms Co.'s Bridgeport laboratory testing the cases of various types of small arms ammunition. Shown here, left to right, on the table are: .22 caliber; .45 caliber for automatic pistols and sub-machine guns; .30 caliber carbine, long range firepower for paratroops; tracer skeet shot gun load; .30 caliber for rifles and light machine guns; .50 caliber for heavy aerial and tank machine guns; .20 millimeter for aerial and tank cannon. In the .30 and .50 caliber groups are represented tracers, armor piercing and other special types


WHY
YOUR YARD CRANE SHOULD BE A NORTHWEST CRAWLER!
Look at the pictures on this page! This is just one day's series of jobs for a Northwest that is saving its owner thousands of dollars a year. Unloading steel plate, scrap, turnings and borings, ashes and coal are all in the day's work for a Northwest.
Northwest Crawler Cranes do things no other type of yard equipment can do. They go anywhere, handle anything, work far from the plant or close to it, work inside or out, pile high or low, are dependable as a truck, need only one man for operation and when you shut the engine off operating expenses cease.
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BUILT IN A RANGE OF 18 SIZES — 4½ TONS CAPACITY AND LARGER
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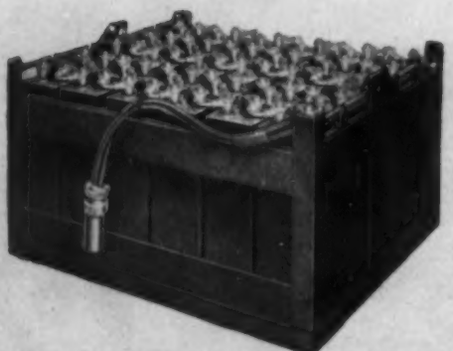
INVESTIGATE THIS Different CRAWLER CRANE
NORTHWEST
The Crane that goes anywhere!

Handy Checklist

FOR BUYERS OF STORAGE BATTERIES FOR INDUSTRIAL TRUCKS

1. Is the battery rugged enough to withstand severe physical shock and vibration?
2. Can it be shortcircuited without injury?
3. Can it be overcharged without injury?
4. Can it be over-discharged without injury?
5. Can it be accidentally reverse-charged without injury?
6. Can it take a full charge in six to seven hours?
7. Is it free from finish-rate limitations?
8. Does it withstand temperature extremes?
9. Is it immune to damage by freezing?
10. Is it free from sulphation?
11. Is it free from shedding of active material?
12. Is it free from buckling of plates?
13. Is it free from jar breakage?
14. Are its assembly and its cell connections simple?
15. Is its life longer than any other type?



★ **IF** the answer to *all* of these questions is "Yes," the battery is an Edison Alkaline Battery.

★ **IF** the answer to *any one* of these questions is "Yes," the battery is an Edison Alkaline Battery.

Edison
ALKALINE BATTERIES

EDISON STORAGE BATTERY DIVISION, THOMAS A. EDISON, INCORPORATED, WEST ORANGE, NEW JERSEY

What You Should Know About the Principles Of Materials Handling, Section III . . .

TRANSPORTATION TECHNIQUES

By ASA S. KNOWLES

ELEVATORS shuffling between the top and bottom of the same shaft involve *reciprocating movement*. When they reach the top of the shaft they must come to a full stop and change their direction of movement before they can provide further vertical transportation. Because of this, only one elevator can be operated on any shaft at one time and only one load can be in process of transportation at any one time. The same principles would be true of tractors and trailers, motor trucks and hand trucks operating in narrow passages that do not have ample space for passing or turning. Similarly, the same principle applies when a one-track railroad is used for materials handling.

Continuous Movement: Very much unlike the ordinary elevator is the bucket conveyor elevator. Buckets attached to a belt may be used to move materials continuously. The buckets reverse their direction by turning, rather than by coming to a full stop, and starting again in the other direction. Moreover, they travel downward without interfering with others that are coming up.

Comparative Advantages: The principles discussed above under the headings of "reciprocating movement" and "continuous movement" apply to other types of conveying devices. By using the hoist elevator and bucket conveyor as illustrations, however, the advantages of each type of movement can be readily noted.

The continuous device permits many loads to be in process of transportation at one time. The reciprocating one must be brought to a full stop and started again even though it is not necessary to facilitate unloading. On the other hand, if a long stop must be made for loading and unloading, there is little to be gained by suspending many items in transit while this is taking place. The continuous device is most advantageous for materials which can be loaded and unloaded while the conveyor is moving. This includes bulk items, such as sand, coal, grain, etc., and packages which are not damaged by automatic handling. For items requiring careful handling, a series of reciprocating elevators may be more desirable.

When floor trucks or overhead railroads are limited to a one-way passage or a single track, the disadvantages of the reciprocating elevator will become evident.

Piling, Loading, and Unloading: Much of the time, energy, and expense consumed in handling materials is devoted to piling, loading, and unloading, rather than to transportation from one point to another. Ordinary piling of objects from the floor up involves:

—a vertical movement equal to or slightly greater than the height of pile,

—a horizontal movement over the top of the pile, so that the object is properly centered, and

—the release of the object into the desired position. Some of these movements may be eliminated if the route of the conveyance is on a higher level than the top of the pile, rather than on the same level as the base.

In loading and unloading any conveyance, there are two general possibilities:

—The conveyance may be stopped and the material may be entered from the top, ends, sides, or conceivably the bottom.

The loading process may often be facilitated by stopping the conveyance in a position that minimizes the handling necessary for piling or pouring. For example, freight cars may be loaded from a platform which is at a level with the floor of the car, and a freight elevator may be continually lowered to keep the top of the pile at a level with the floor, eliminating the necessity of lifting the materials to place them on the top of the pile.

Material may be placed in a position so as to be picked up by the conveyance as it moves along. (Materials which are delicate or fragile are not adaptable to this type of loading.)

Much laborious piling may be reduced by the use of tote boxes, movable racks, etc. For example, materials may be piled beside a processing machine as they are moved by the operator, then repiled on an industrial truck for transportation to the temporary storeroom for drying, piled again from the truck to the storeroom racks, and later piled onto a truck for transportation to the next process. But, if they are piled on a movable rack as they are taken from the first process, this rack may be taken to the storeroom, left there, and then moved to the next process, where it is unloaded by the operator as he feeds his machine.

Handling Equipment: Executives who are confronted with material handling problems should consult engineers of handling equipment manufacturers who are specialists in the uses of particular types of equipment as applied to solve particular problems. For example, engineers representing manufacturers of conveyor belts know the best possible and most economical uses of conveyor belts. Similarly, other engineers are expert in the possible applications of overhead handling systems such as cranes or chain conveyors.

In approaching a material handling problem, engineers concern themselves first of all with the materials and products to be handled. In particular, they study the form of the product—bulk, package, liquid, etc. When the product has been carefully studied, attention is focussed on these items: special problems created by the construction of factory buildings; load bearing capacity of floors; limitations imposed by present arrangements of equipment and machinery; volume of materials to be moved during a given work period; and the number of hours during which the handling must be accomplished.

It is usually wise to consult more than one material handling equipment manufacturer in order to obtain the benefit of the constructive imagination of more than one engineer. Perhaps above all else, it must be recognized that the purchase of material handling equipment is expensive and that some types of handling equipment are very costly to operate.

An elaborate handling system may prove attractive and inviting, but it may also prove to be so expensive as to more than offset expected gains in manufacturing efficiency.

When solved, all materials handling problems require action in either one or a combination of two directions:

—the purchase and use of standard materials handling equipment which is best suited to move particular materials and products; and

—the construction of special equipment designed to meet particular needs.

In either case, the materials handling equipment that will be used will be an adaptation or combination of certain basic types.

From *Supervision*.

Uses Substitute Reflector For Fluorescent Luminaires

Effective lighting without secrificing lighting efficiency or ease of installation and maintenance is how Commercial Metal Products Co., 2251 West St. Paul avenue, Chicago, describes its new substitute metal-saving fluorescent luminaire.

The nonmetallic reflector of the unit features a baked white Glazenamel reflecting surface and baked gray-enamel exterior. The ballast is mounted on the outside of the pressed-steel wire way for cooler operation.

Luminaires are being offered in four models with lamp combinations as follows: Two 40-watt lamps, three 40-watt lamps, two 100-watt lamps and four 100-watt lamps.

Effect of Intensifying Additions to . . . .

NE-9440 ALLOY STEEL

ACCOMPANYING data, obtained from a single heat, are intended to show the effect of the addition of Grainal on the Jominy hardenability, tensile properties and impact strength (including tests at low temperature) of a steel made to meet specifications for NE-9440. Samples used in these tests represent both untreated and Grainal-treated (4 pounds per gross ton) ingots from the same commercial basic open-hearth heat. The base heat to which the addition was made was of very high quality; nevertheless Grainal appears to have further improved it.

The Jominy hardenability curves are plotted on the logarithmic chart recommended by the Society of Automotive Engineers. There is also included a form similar to one used by a large steel company in presenting NE steel data recently. This differs somewhat from the usual ASTM chart in that the approximate, expected hardness at the center of round bars of different sizes, when quenched in either oil or water, can be read directly from the Jominy curve.

Values for the tensile test are the average of the results from two test bars. The Izod values are the average of four tests, two notches per test bar. Keyhole notch Charpy specimens were used for the low temperature tests; the values quoted are averages from two test bars.

Specimens for steels of this general class—namely, carbon and very low alloy steels with intensifying additions, have recently been published as Ordnance Department, United States Army Tentative Specification AXS-930 (dated March 30, 1943). The steel described in this memoranda not only meets the requirements of Grade WD-94T40 but develops properties considerably above the specification minima. Such steel, Grainal-treated, is already being specified for a considerable number of parts.

Hardenability Tests: The marked effect of the Grainal addition in increasing the capacity for hardening of this base steel composition is quite apparent from the Jominy curves. Whereas, in the untreated steel, a hardness of 50 rockwell C was obtained at 0.31-inch from the quenched end of the Jominy bar. In the case of the Grainal-treated steel this was extended to 1.22 inches. For 40 rockwell C, the distances were 0.56-inch in the case of the untreated steel, and 2.17 inches in the case of the treated steel.

It is evident from these results that the range of sizes which may be fully hardened is considerably greater in the case of the Grainal-treated. Thus application of the NE-9440 may be extended, by means of Grainal treatment, to include a class of quenched and tempered machine parts for which the untreated steel would be wholly unsuitable.

Tensile and Izod Tests: The effect of the Grainal treatment on the tensile and Izod impact properties after various tempering temperatures is shown, for the foregoing steels, in the attached Tables I and II.

Two sets of data are given. The first are those from test bars heat treated from 0.530-inch diameter section and tempered from 400 to 900 degrees Fahr.; and the second, a series heat treated in bars of 1-inch diameter section and tempered from 800 to 1300 degrees Fahr.

If both the untreated and Grainal-treated steels harden fully, such as in small sections, even then the Grainal-treated steel is notably superior to the plain steel, particularly with respect to those properties which indicate toughness (elongation—reduction in area—Izod impact—"P" value).

The improvement is observed at all tempering temperatures. but is especially high at the lower temperatures. It will be further observed that this improvement in the ductility factors persist to a substantial though decreasing amount even follow-

TABLE I—PHYSICAL PROPERTIES (0.530-INCH TEST BARS)

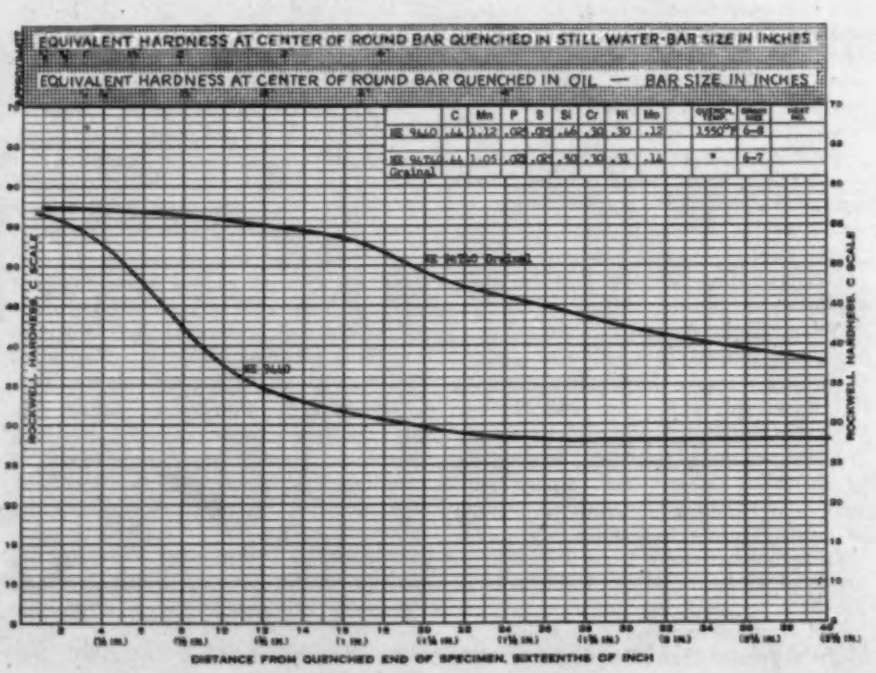
These 0.530-inch test bars were normalized at 1650 degrees Fahr. for ½ hour, preliminary machined, reheated to 1500 degrees Fahr. for 20 minutes, quenched in oil and tempered as shown.

Temper °F.	Type	Yield Point	Tensile Strength	Elong.	R.A.	B.H.N.	Izod	* "P" Value
400	N. E. 9440	236,200	294,950	10.0	35.4	546	9.2	101.5
	N. E. 94T40 Grainal	216,350	286,900	12.3	46.5	545	22.8	113.0
500	N. E. 9440	238,300	280,450	9.8	41.3	516	6.4	106.0
	N. E. 94T40 Grainal	234,800	275,900	11.5	46.2	506	17.6	111.0
600	N. E. 9440	230,350	256,450	11.3	47.3	480	5.0	108.0
	N. E. 94T40 Grainal	230,050	252,500	12.0	51.6	482	16.0	112.5
700	N. E. 9440	210,500	228,300	11.0	48.8	444	9.3	104.0
	N. E. 94T40 Grainal	208,600	224,350	12.0	52.5	437	15.8	108.0
800	N. E. 9440	190,300	201,050	12.5	52.7	412	20.6	103.0
	N. E. 94T40 Grainal	188,400	196,650	13.0	54.8	397	31.3	105.0
900	N. E. 9440	167,750	175,700	13.8	52.3	362	42.5	98.0
	N. E. 94T40 Grainal	162,500	172,000	14.8	57.0	354	47.9	103.0

* The "P" Value is calculated from the formula: $P = \frac{TS + 6000RA}{5000}$ and serves as a toughness-strength factor.

Chemical Analysis

	C	Mn	Si	S	P	Cr	Ni	Mo	A.S.T.M. Grain Size
NE-9440	0.44	1.12	0.46	0.025	0.023	0.30	0.31	0.12	6—8
NE-94T40 Grainal	0.44	1.05	0.50	0.025	0.021	0.30	0.31	0.14	6—7


EQUIVALENT HARDNESS AT CENTER OF ROUND BAR QUENCHED IN STILL WATER-BAR SIZE IN INCHES
EQUIVALENT HARDNESS AT CENTER OF ROUND BAR QUENCHED IN OIL — BAR SIZE IN INCHES
NE 9440
NE 94T40 Grainal
ROCKWELL HARDNESS, C SCALE
DISTANCE FROM QUENCHED END OF SPECIMEN, SIXTEENTHS OF INCH

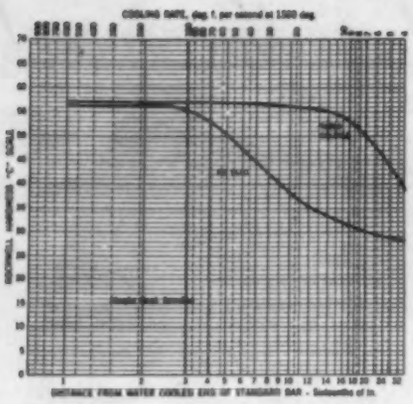
From information recently released by Vanadium Corp. of America, 420 Lexington avenue, New York.

It's the **GUIDE**, *not the dude, that steers the course!*

TRANTINYL
MILL GUIDES
ARE STEERING
THE COURSE FOR
BETTER FINISHED
STEEL IN MANY
OF THE NATION'S
GREATEST PLANTS

Youngstown Alloy Casting Corporation

YOUNGSTOWN, OHIO



ing tempering in the upper ranges of temperature.

It is believed that the physical properties developed by the Grainal-treated steel, for example those shown by the test pieces tempered at 400 degrees Fahr., are quite remarkable for a composition of such modest alloy content and worthy of careful consideration.

Tabulated below are the surface hardness results (brinell 3000-kilogram test) on 1-inch rounds, oil quenched from various temperatures:

Quenching Temperature °F.	Steel Hardness, Brinell NE-9440	NE-94T40
1300	200	217
1400	444	507
1450	522	551
1475	514	555
1500	522	555
1525	514	555
1550	514	555
1575	514	551
1600	534	555
1650	514	514
1700	495	555

The Grainal-treated steel has more uniform hardness above 1450 degrees Fahr., and also has about 40 brinell units higher hardness in the as-quenched condition than the untreated steel.

As previously pointed out, use of the Grainal treatment extends the use of the NE-9440 steel to a far wider range of section size than is possible without such treatment. Too, the enhancement of properties, as evidenced for example by "P" value, is such that Grainal-treated steel may be utilized in applications where service requirements cannot be met by the base steel.

TABLE II—PHYSICAL PROPERTIES (1-INCH TEST BARS)

These 1-inch test bars were normalized at 1650 degrees Fahr. for ½ hour, reheated to 1525 degrees Fahr. for ½ hour, quenched in oil, tempered as shown and machined.
Chemical Analysis: Same as in Table I.

Temper °F.	Type	Yield Point	Tensile Strength	Elong.	R.A.	B.H.N.	Izod	• "P" Value
800	N. E. 9440	176,900	197,900	12.0	48.1	396	16.8	97
	N. E. 94T40 Grainal	188,300	198,050	13.0	53.8	402	27.5	104
900	N. E. 9440	159,350	172,700	14.0	51.6	361	40.8	97
	N. E. 94T40 Grainal	163,500	171,700	15.3	56.6	359	49.3	102
1000	N. E. 9440	141,600	154,100	16.5	55.2	321	56.5	97
	N. E. 94T40 Grainal	142,700	152,700	16.8	57.5	321	62.8	99.5
1100	N. E. 9440	125,100	139,000	19.0	58.3	293	77.3	98
	N. E. 94T40 Grainal	126,700	138,700	19.0	59.7	291	79.6	99
1200	N. E. 9440	110,300	121,000	22.5	63.3	256	92.5	100
	N. E. 94T40 Grainal	111,200	120,000	22.0	64.0	255	96.6	99
1300	N. E. 9440	96,000	107,500	25	65.0	227	96.8	99.5
	N. E. 94T40 Grainal	96,450	105,200	25.8	66.1	221	98.2	100.5

• The "P" Value is calculated from the formula: $P = \frac{TS + 6000RA}{5000}$ and serves as a toughness-strength factor.

TABLE III—LOW-TEMPERATURE TESTS

Type	Temper °F.	B.H.N.	Charpy Ft. Lbs. at °F. 70°	0°	—25°	—50°	—75°	—90°
N. E. 9440	450	530	9.7	9.0	8.5	7.5	7.0	7.0
N. E. 94T40 Grainal	450	535	23.0	18.5	19.0	16.7	17.7	18.2
N. E. 9440	900	361	23.7	20.5	20.0	19.2	16.5	16.2
N. E. 94T40 Grainal	900	359	25.7	26.0	26.0	24.0	23.5	20.5
N. E. 9440	1100	293	29.5	31.7	30.2	29.2	24.0	24.5
N. E. 94T40 Grainal	1100	291	33.0	34.0	31.7	31.2	31.0	28.2

Chemical Analysis: Same as in Table I.

Commercial use of many thousands of tons of Grainal-treated steels has amply demonstrated that these advantages may be obtained not only without any sacrifice in fabrication but in fact often with a valuable decrease in shop problems incident to forging, heat treating, machining and the like.

Low Temperature Impact Properties: In view of the growing importance of low temperature properties, the following data was submitted. The results cover a range of hardness for quenched and tempered plain and Grainal-treated NE-9440 steels and show the marked superiority of the Grainal steel under these test conditions.

All bars for low temperature testing were initially normalized as 1-inch rounds at 1650 degrees Fahr. For the 450 degrees Fahr. temper, the specimens were machined to 0.44-inch square before hardening by oil quenching from 1500 degrees Fahr. For the other two tempering temperatures, the specimens, as 1-inch rounds, were oil quenched from 1525 degrees Fahr.

The use of Grainal thus appears to permit reduction in the amount of strategic alloying elements previously used to give the desired tensile and impact properties in similar sections. This extension of the application of NE steels should effect additional savings in critical alloying elements.

Harnessed Air Eliminates Use of Extra Equipment

Directing a blast of compressed air for less than 5 minutes through a tall flue recently solved the problem of driving off fumes from an electric furnace used to oil-harden small metal parts at Tinnerman Products Inc., Cleveland. It was done without necessitating the installation of extra equipment, the Compressed Air Institute, New York, reveals.

In hardening parts, oil remaining on the metal stampings begins to bake off and produce fumes after the heat is started in the furnace. The jet of air, shot inside the flue at a pressure of about 60 pounds per square inch, induces sufficient draft to carry off the fumes and to create a steady flow until normal natural draft builds up from furnace operation. After the draft is functioning normally the compressed air is cut off.

The compressed air is piped directly to the flue. At the flue end an elbow is used to direct the air upward.

Secret Method Banishes Reflection in Glass

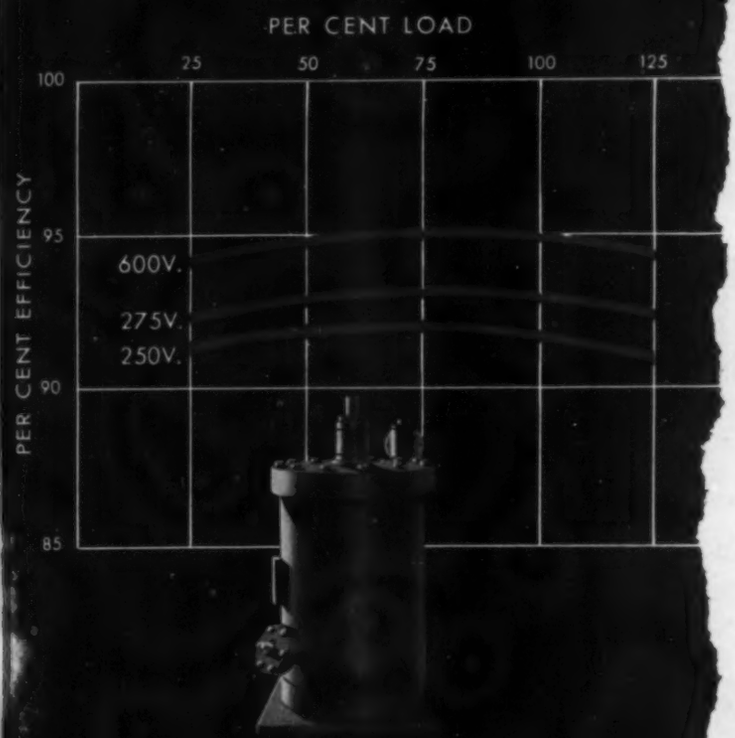
Non-reflecting eyeglasses and windshields are made possible for the first time by a new discovery for taking light reflections out of glass and other materials, American Optical Co., Southbridge, Mass., revealed in a recent announcement. Considered a military secret, the development's chemical composition and method of application were not made public. Previous methods of removing such reflected light, the company stated, were limited to relatively small pieces of such materials. The new surfacing technique, it added, also increases the durability of the treated substance and at the same time does not damage the original surface.

Efficiency of lens systems in eye-examining instruments, microscopes and other scientific devices may be improved by the development. In addition, faster camera lenses which produce sharper pictures in normal light and clearer pictures in poor light will be made possible, the optical company predicted.

efficiency

for Power Conversion

peak loads... light loads... 24-hour loads



This chart shows that the Ignitron Rectifier maintains its high efficiency over the entire load range . . . a fact which offers decided advantages in many applications.

For highly fluctuating loads, Ignitron Rectifiers offer decided advantages in power conversion. Here's why:

1. The Ignitron can operate at full capacity 24 hours a day, maintaining uniformly high efficiency.

2. It can handle high load swings easily, making it adaptable to widely diversified service conditions.

3. Efficiency at light loads is considerably higher than by other conversion methods, contributing to economy of operation.

Ignitron operating costs are low. Simplified control, low arc drop loss, the elimination of high starting demand and absence of major moving parts hold both operating and maintenance costs to a minimum.

Installation is easy, too. No special foundations are required. An Ignitron can be installed on any level floor of reasonable strength.

Investigate the advantages of the Ignitron for your particular d-c power requirements. Your nearest Westinghouse office can give you full information. Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

In the steel industry

The inherent advantages of the Ignitron Rectifier make it ideally suited for steel mill service. Outstanding features are high, short-time overload capacity and uniformly high efficiency throughout the load range. Also, since there are no major moving parts to be affected by dirt and grit, the Ignitron requires less maintenance.

For further information about the Ignitron Rectifier, write Dept. 7-N for your copy of Book B-3024.

J-10252-1

Westinghouse *Electronics at Work*

IGNITRON RECTIFIERS

PLANTS IN 25 CITIES
OFFICES EVERYWHERE

Developments in . . . .

CONTINUOUS GAS CARBURIZING

By R. J. COWAN
Surface Combustion
Toledo, O.

(Concluded from Sept. 13)

LIMITATIONS which represented handicaps to be overcome in expanding use of the continuous gas carburizing process were discussed in first part of this article. Here we will trace the various steps taken to overcome these problems and the reasons for methods now being used will be examined.

The three major developments which have had a part in bringing continuous gas carburizing to its present state of perfection can be enumerated as follows: A—the use of so-called CG gas; B—the RX generator; C—the radiant tube heating element. These will be considered here in the order listed.

A—The Use of CG Gas: At the time when butane and propane were first used in industrial operations, the difficulties arising from the formation of carbon scale as described in part one (Sept. 13) were so great that it became necessary to make a change in the operation and to use, in conjunction with these hydrocarbons, a diluent gas which would tend to prevent the formation of liquid tars in the carbon precipitation zone of the furnace.

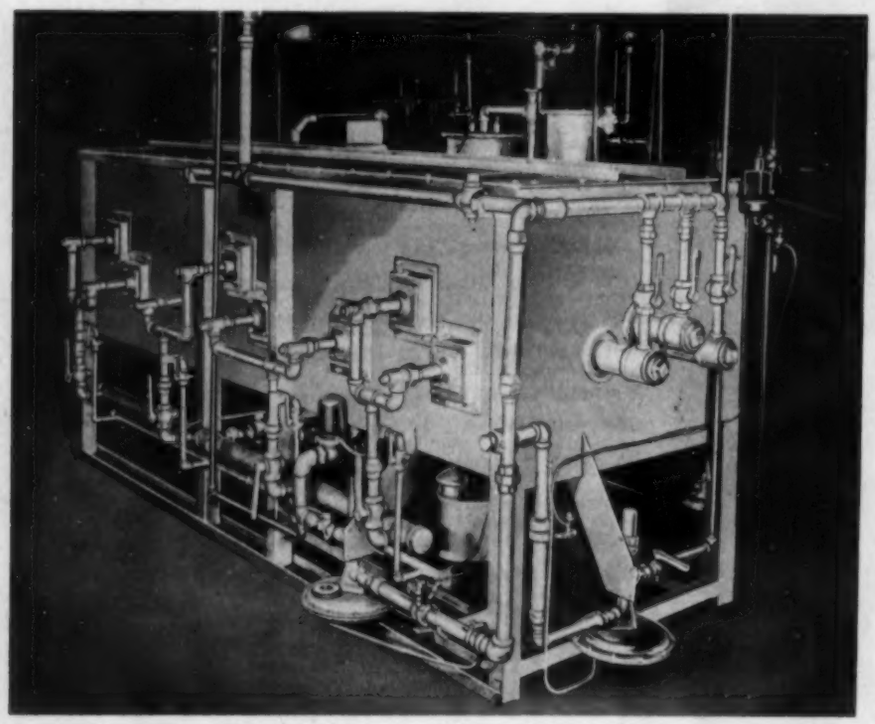
A high hydrogen-containing gas would do this. Such a gas was produced by passing mixtures of the hydrocarbon (butane or propane) and air in proportions outside the combustion limits through an externally heated tube of heat-resisting alloy. When produced at a temperature of 1800 degrees Fahr., the gas had the following composition: No oxygen; 0.2 per cent carbon dioxide; 20.5 per cent carbon monoxide, 36 per cent hydrogen; 3.8 per cent methane; 0.5 per cent water vapor; 39 per cent nitrogen.

The type of unit used for this purpose is shown in Fig. 3, together with a diagram explaining the operation, Fig. 4. To obtain this so-called CG gas, it is necessary to use a catalyst in the tube itself, which in this case, is in the form of an iron channel or tube.

While the use of this gas overcame the formation of carbon scale and eliminated spotty carburization, it was not able to overcome the effect of carbon precipitation in the high temperature zone or to control the carbon content of the case to the degree desired. In addition, the alloy problem still remained in connection with the use of trays and fixtures, although not to the same extent as in the earlier installations. The use of CG gas made it possible to employ butane and propane for carburizing purposes in a manner that proved quite acceptable.

B—The RX Generators: Subsequent studies revealed the strong effect of water vapor upon the carburizing reaction. This effect had been understood for some time, but it required considerable investigation to develop the kind of equipment necessary to produce a diluent gas in which the moisture content was low. To begin with, the CG unit was revamped to produce a gas free from carbon dioxide and with a moisture content uniformly variable within definite limits. To do this, a different type of catalyst was used, and the unit took on an external form entirely different in appearance. This became known as the RX gas generator, shown in Fig. 5, together with a diagrammatic sketch showing the method of operation, Fig. 6.

Furthermore, it became necessary to produce a furnace structure of such a design that the atmosphere within the carburizing chamber would not be upset by the operations of charging or discharging. Therefore, special attention was paid to the sealing of the vestibules on each end of the furnace and the necessary precautions taken to prevent the admission of oxygen or oxygen-con-



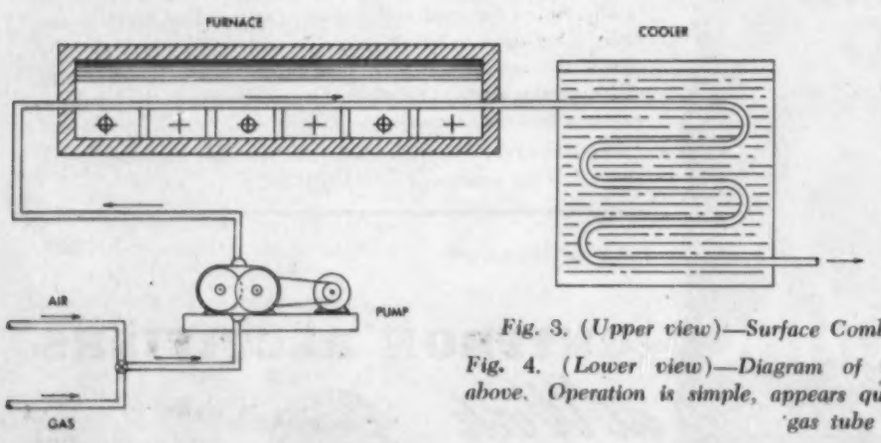
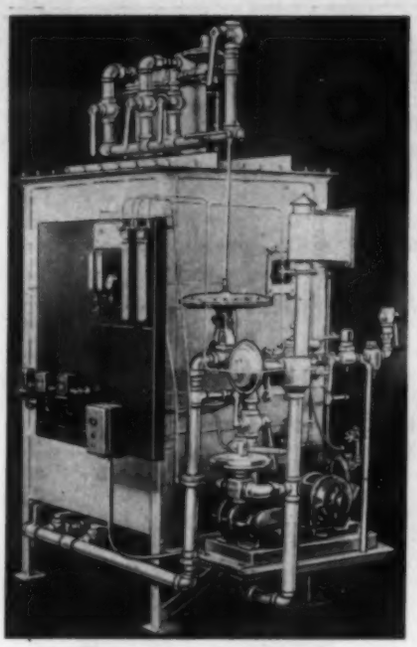


Fig. 3. (Upper view)—Surface Combustion's CG gas preparation unit

Fig. 4. (Lower view)—Diagram of CG gas preparation unit pictured above. Operation is simple, appears quite easily controlled. Catalyst is in gas tube itself



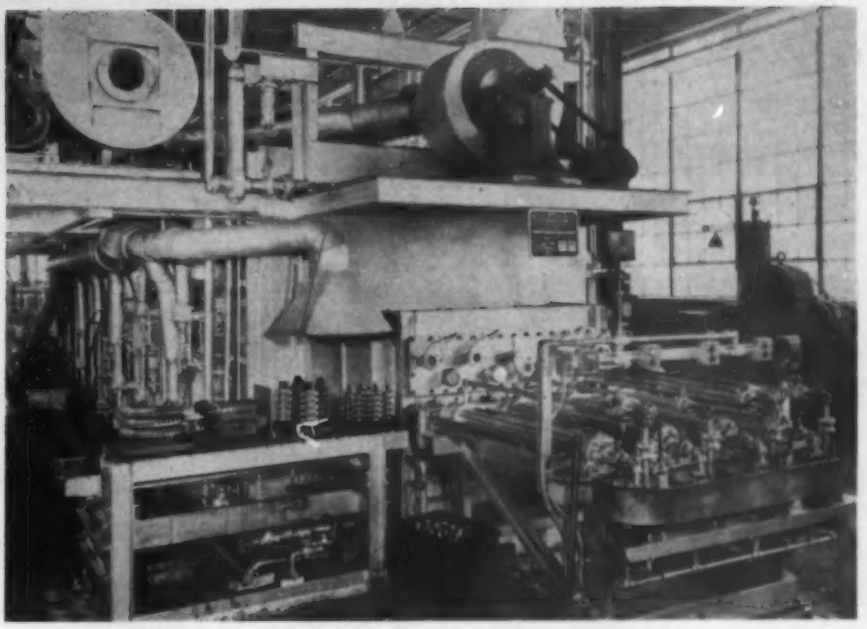


Fig. 5. (Upper left)—The RX gas preparation unit shown here likewise partially combusts gas but uses catalyst in form of granular material in vertical tubes as shown in Fig. 6.

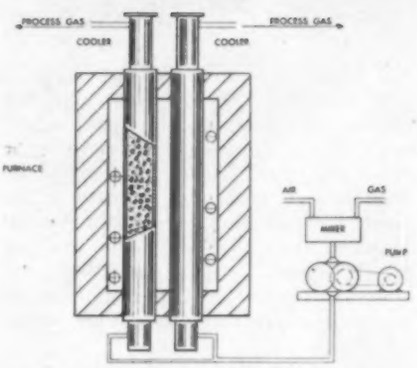


Fig. 6. (Lower left)—Diagram of construction of RX gas generator showing operating elements of system

Fig. 7. (Above)—Charging end of 4-row gas carburizing furnace. Pusher for each row can be seen at extreme right

taining gases which, within the carburizing chamber, would be converted readily into water vapor with its attendant evils.

When this was done, it was found that the remaining handicaps had been overcome and that results were produced which were indeed superior in quality. In the first place, the alloy effect practically dropped out. This was due to the fact that under these conditions it became possible to reduce the methane content of the carburizing gas to a mere fraction of its original amount. With a gas of this new low composition, ordinary casting defects are not ruinous.

The lesser amount of hydrocarbon in the atmosphere also made it possible to produce clean work without any free carbon on it. In fact, the work is so clean that one is led to question whether it has been carburized at all since it has the appearance of decarburized work. Examination reveals, however, a very uniform case with a constant carbon content.

There is no excess carbon in the atmosphere. This makes it possible to regulate the carbon content of the case to within very close limits. In fact, this regulation is so close that it is possible with the same combination of gases to heat treat a high carbon steel that has been decarburized on the surface in such a way as to restore the original carbon content of the metal. When the operating conditions have become stabilized, it is possible to control the carbon content of the case by control of the moisture content of the gases leaving the carburizing chamber. This may be done by regulating the moisture content of the RX gas by changing either the operating temperature or gas mixture.

It is thus seen how the various handi-

(*Please turn to Page* 113)

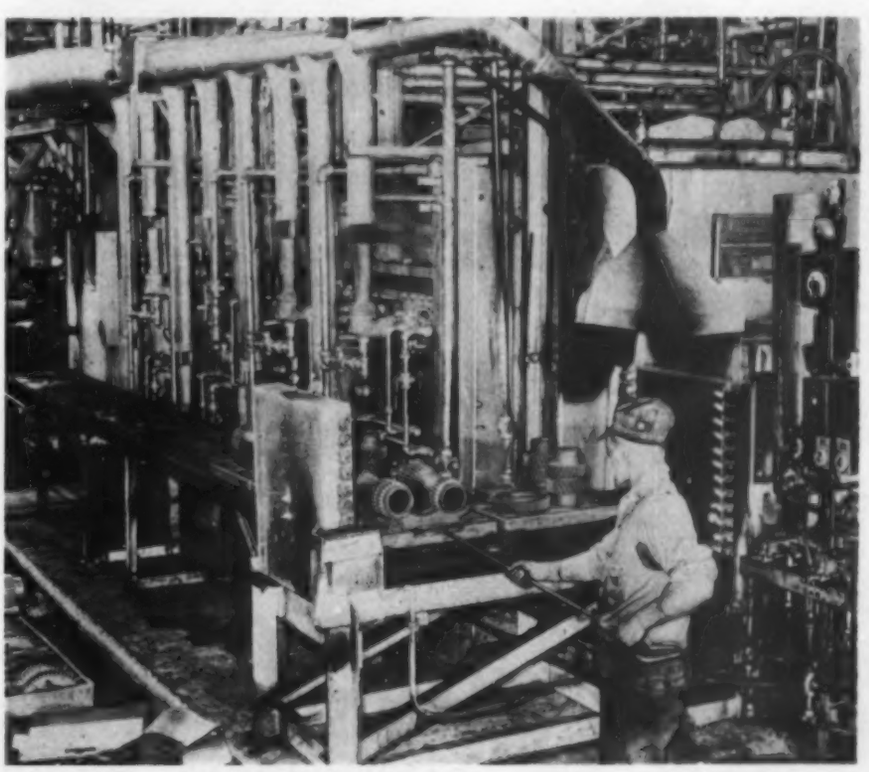
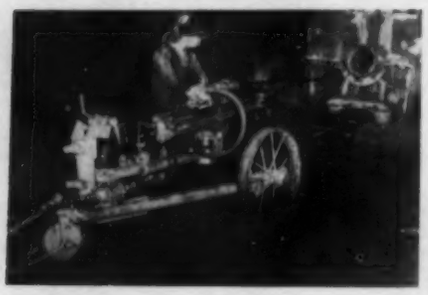


Fig. 8.—Discharge end of a carburizing unit similar to Fig. 7 is shown here. Note different class of work being handled. Overhead piping exhausts fumes from radiant tube burners

INDUSTRIAL EQUIPMENT

Core Breaker

Foundries now may clean cores of heavy castings in one-half to one-eighth the time formerly required with the use of the new Mogul core breaker developed by Cleveland Rock Drill Co., 3781 East Seventy-seventh street, Cleveland. In a



recent demonstration, long crane drum castings weighing 12 to 14 tons, requiring the labor of four men for 3 days to clean, were cleaned with the machine in less than a day, with two men doing the work.

The unit comprises a powerful pneumatic hammer mounted on wheels. Mounting is designed to permit raising or lowering the hammer-vibrator, or swinging it from side to side. Standard 1¼-inch round drills with detachable bits are employed.

When operated, the machine is rolled up to the casting to be cleaned, the hammer quickly raised to position and the drill bit is fed into the core selected. The operator utilizes the quick-acting pneumatic feed to ram and withdraw the steel bit in and out of the core. The combination of the ramming action, hammering, rotation of the bit and consequent vibration, results in the quick disintegration of the cores.

An attachment for pulling rods out of large cores is now being developed. The principle of the rod puller is already proved, and the unit will be in production at an early date.

Large Radius Bender

All types of tubing, channel, angle, I-shaped sections and round, square, flat or any other shaped solid or open cross-

section materials can be formed or duplicated with the new No. 3 Di-Acro bender recently placed on the market by O'Neil-Irwin Mfg. Co., Minneapolis 15. Especially designed for large radius bending, the unit can readily be converted for forming all types of regular or irregular shaped materials, including spring-tempered metals within their ductile limits.

Accuracy of the bender is guaranteed to a tolerance of 0.001-inch in all duplicated work. It features 2-way action—right or lefthand mounting or operation. Its automatic and reversible forming nose is similar in operation to those on the company's smaller model. Length of the operating leverage is 25 inches. Increased leverage in any amount necessary, up to a total of 80 inches, may be added readily. Capacity of the bender is ½-inch for round cold-rolled steel bar. Twelve right or lefthand operating positions for either bench or pedestal mounting are provided with the standard bender.

Carbide Tool Grinder

Massive streamlined base, improved wet-grinding equipment and better motor mounting are among the improvements of the new model EE heavy-duty carbide tool grinder announced by Thom-

as Prosser & Son, 120 Wall street, New York. The machine also includes quick-acting indexing tables. The drive is by means of double V-belts from the motor which is mounted on a hinged base. Vibration is reduced to minimum. High speed of the spindle provides maximum grinding efficiency.

The wet-grinding equipment consists of a coolant pump, pan, settling tank, piping and nozzles. The nozzles are arranged so the flow of coolant can be directed on the tool regardless of which side of either wheel is being used. Either diamond or silicon-carbide cup wheels can be used on either end of the unit grinding carbide tools, or aluminum oxide roughing or finishing wheels for grinding high-speed steel, stellite, etc. The wheels are mounted on steel backing plates, adequate compensation being provided for wheel wear.

Motor is of the totally-enclosed dust-proof type. It is furnished with a high-grade drum on-off-reverse switch so that roughing and finishing of both right and left-hand tools can be done conveniently with the wheels always rotating toward the cutting edge of the tools.

Motor-Alternator Sets

Converting direct current to alternating current for various applications is the function of a new line of 2-bearing 3600-revolutions-per-minute motor-alternator sets announced by Motor Division, Gen-

eral Electric Co., Schenectady, N. Y.

In operation the direct-current motor of the set drives the alternator, which has a field connected in series with the motor armature. An increase in the alternator load causes an increase in the motor load, so that more direct current is drawn from the line. The resulting greater direct current strengthens the alternator series field, thus tending to maintain a constant alternating-current voltage.

Both motor and alternator of these sets are similar in that the armature windings are on the rotating elements and the fields are stationary, being attached to the frames. A solid shaft, supported by a ball bearing at each end, serves to mount the rotating members of both the motor and the alternator. The sets are easy to disassemble—the complete rotating unit may be pulled out of the stator merely by removing an end shield.

Snap Gage

A new No. 1618 rapid-inspection limit snap gage offered by Greenfield Tap & Die Corp., Greenfield, Mass., makes short work of inspecting precision parts. Its feature is an extended lower anvil, which enables the work to be readily located

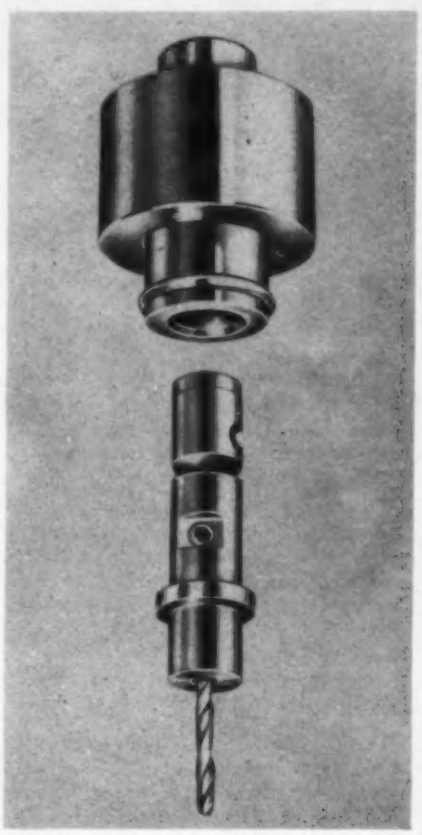
(All claims are those of the manufacturer of the equipment being described.)

and leveled before moving toward the "go" and "no go" anvils. This applies both to measuring diameters of round parts and to gaging external lengths. The extended anvil also facilitates gaging work in the machine.

Drill Chuck

An operator can change drills and other tools rapidly while the motor is running when using the new high-speed drill chuck, called the Centrif-O-Matic, now being offered by R. M. Wright Co., Washington Square building, Royal Oak, Mich.

Change of tools is accomplished by sliding back an outer sleeve on the chuck. This releases a centrifugal lock and permits the tool and its adapter to be removed. A new tool is inserted and the sleeve snapped back in position. Subsequently the tool locks by centrifugal action. Centering is automatic and positive.



Drill adapters for the chuck are offered to accommodate drill sizes from $\frac{1}{16}$ to 9/32-inch, letter drills from A to K and wire drills from 1 to 60.

Checking Machine

A new machine that precision checks ball bearings faster than with methods formerly used is reported by Sheffield Corp., Dayton, O. It checks and sorts ball bearings of dimensions ranging from ⅛ to 11/16-inch, at rates roughly from 15,000 to 20,000 per hour.

With the Sheffield machine, balls are

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THE NEWPORT ROLLING MILL CO.
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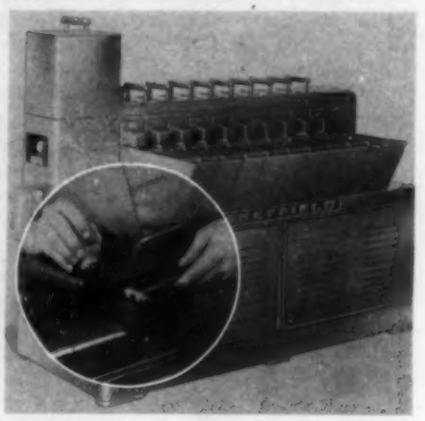
The Andrews Steel Company produces a limited range of aircraft quality alloy plates.

placed in a hopper and a walking beam or arm lifts them a few inches and places them over an opening with exactly parallel sides. If the balls are of the same size as the opening, or smaller, they fall through and are retained in a compartment below. This first step eliminates all undersize balls. The balls remaining on top of the opening are carried by the walking beam to the next



stage where the aperture is slightly larger. The process is repeated until the balls drop into one of the divisions, or are too large to pass inspection and fall into the last compartment.

The machine can be set to segregate the balls in ten classifications; those that are undersize, then eight successive steps, each about 0.00005-inch larger than the preceding size and an additional station for oversize balls.

Master blocks having Carboloy inserts are used for the progressive steps of 0.00005-inch. Dimensions of the inspection steps can be regulated by changing the size of the opening between the parallel sides.

Lamp Ballast

Acme Electric & Mfg. Co., Cuba, N. Y., is offering a new air-cooled fluorescent lamp ballast for exposed mounting on fluorescent lamp fixtures. The ballast differs from conventional design only in that the leads are brought out through outlets in the base plate.

Because of the exposed installation, the ballast will operate at lower ambient temperatures than those units which are enclosed. The lamp ballast does not require special installation devices and is built in ratings for single, two, three and four-lamp fixtures with ratings of 40 to 100 watts.

Cut-Off Machine

Principal improvements in the new 47 P Abrasaw cutter recently introduced by Bridgeport Safety Emery Wheel Co., Bridgeport, Conn., include better appearance and construction. It now is mounted on a base consisting of a single casting and features a large coolant tank in the base and coolant pump at the rear. The machine handles solids

Helpful Literature

1. Fluid Filters

Fostoria Pressed Steel Corp.—16-page illustrated bulletin on "Localized Filtering" describes design, installation and operation of various sizes and types of coolant filters which are adaptable for maintaining clean coolants in connection with grinding, honing, lapping, burnishing, polishing and broaching operations. Filters may also be used for removing scale, dirt and other impurities from air, oil or water lines.

2. Threading Machines

Oster Mfg. Co.—36-page illustrated booklet on "No. 800 Series" pipe and bolt threading machines is combined operator's maintenance and spare parts manual. Detailed instructions are listed and all parts of machines are described.

3. Heat Treatment

National Copper Paint Corp.—7-page bulletin No. 117 explains accepted methods for heat treatment of steel using "Sel-Car" to prevent carbon penetration in defined areas of low carbon steel, to provide surface protection of steels subject to decarburization, to prevent scaling and oxidation and to protect surfaces of carburizing boxes. "Sel-Nite" prevents nitrogen penetration and increases impact resistance of steels.

4. Inspection Method

Magnaflux Corp.—8-page illustrated bulletin on "Zyglo" describes operating principle and applications of this fluorescent penetrant method for detecting surface flaws in solid materials such as non-magnetic metals, ceramics and plastics. Significant discontinuities are revealed by application of black light which produces fluorescent indications. Also described are other "Magnaflux" inspection methods.

5. Resistance Welder

Sciaky Bros.—16-page illustrated bulletin No. 101-B covers design features and applications of model PMCO 2S-5 electric resistance welder for aluminum and its alloys. Operating principle is outlined in detail and use of variable pressure cycle with precompression is discussed. Electrical and mechanical features are pictured and described. Typical welds are shown and charts give shear test values.

6. Contour Milling

Onsrud Machine Works, Inc.—6-page illustrated folder is descriptive of A-80 series of automatic contour milling machines for production milling of long parts. Up to four operations can be completed in single pass through machine and carriage speed range is adjustable from 4 inches to 18 feet 6 inches per minute. Each of four cutters is driven by independent motor.

7. Steel Stock List

Joseph T. Ryerson & Son, Inc.—232-page illustrated "1943-44 Stock List" is fully indexed directory on stocks of beams, channels, angles, plates, bars, NE alloys, aircraft alloys, heat treated alloys, tool steel, sheets, stainless steel, tubing, babbitt, welding rod, bolts, reinforcement and other products. Also included is useful data on physical properties, compositions, area of plates, weights of bars and conversion tables.

8. Portable Sander

Sterling Tool Products Co.—4-page illustrated bulletin, "Faster Production for War Industries," is descriptive of new "Sterling 1000" portable electric sander which is claimed to be vibrationless in operation. Several features which have been incorporated in design of this tool are covered in detail. Unit plugs into any lighting or power circuit and imparts rapid circular motion to sanding pad for all types of finishing operations.

9. Magnetic Separator

Stearns Magnetic Mfg. Co.—4-page illustrated bulletin No. 120 describes type QS magnetic screen filter separator which is designed for batch operations requiring removal of iron and steel particles from liquids. Sizes from 160 to 460 watts with capacities from 75 to 700 gallons of liquid per hour.

10. Flexible Couplings

Thomas Flexible Coupling Co.—65-page illustrated catalog No. 36 describes full line of standard all-metal "Thomas" flexible couplings. Engineering data and rating table necessary for selection of proper size and type of couplings for various applications are included. Claimed features include elimination of wearing parts, backlash and need for lubrication; end float construction and adaptability for all service including reversing operations.

11. Levels

Stanley Tools division, The Stanley Works—4-page illustrated bulletin on "Stanley Red Glass" levels for shipbuilders and shipfitters is descriptive of this 24-inch level which is made of cherry and is easy to adjust. Red glasses can be adjusted to any required pitch or declivity up to and including 2 inches to the foot. Green glasses remain stationary for common level applications.

12. Micro Projector

George Scherr Co.—6-page illustrated bulletin gives detailed instructions for setting up and operating the "Wilder" micro projector. Instrument is designed for projecting magnified image or profile of work onto large screen for checking dimensions, profile or other factors. Magnifications of 10 and 20 times are possible.

13. Coolant Coolers

Kramer Trenton Co.—4-page illustrated bulletin No. R-443 describes complete line of shell and fin tube coolant coolers which are adaptable for use with water or refrigerant. Capacities, with 10 degree coolant temperature reduction, range from 4.3 to 180 gallons per minute. Brackets are available for wall, floor or ceiling mounting.

14. Forge Welder

Progressive Welder Co.—4-page illustrated bulletin No. 301 on "Temp-A-Trol" forge welders discusses flexibility, weld quality, weld size, production and other factors of comparison between this machine and conventional models. This welder has thermocouple incorporated in electrode which provides exact control over temperature of weld, independent of operator. Preselected cycle is automatic.

15. Thread Grinder

Sheffield Corp.—12-page illustrated bulletin No. M100-143 outlines design and application features of No. 100 series precision thread grinder. This production machine uses either conventional single-ribbed wheel or multi-ribbed wheel and either traverse grinding or plunge cutting may be employed. Capacity is claimed to be ample for 90 per cent of all normal thread grinding needs in production plants.

16. Industrial Casters

Faultless Caster Corp.—36-page illustrated catalog No. 155 contains descriptions, specifications and application data on all sizes and type of casters for industrial use. Swivel and rigid casters with plastic, rubber tired and semi-steel wheels which are ball, roller or plain bearing equipped are covered.

17. Processing Materials

G. S. Rogers & Co.—12-page illustrated general products bulletin contains brief descriptions of such materials as pack carburizers, quenching and tempering oils, heat treating salts, rust preventives, leather oils and greases, cleaners, drawing compounds, core oils, straight cutting oil bases, soluble cutting oils, textile oils, sulphonated and blended oils. Various specifications in each group are covered.

18. Industrial Equipment

W. W. Sly Mfg. Co.—20-page illustrated condensed catalog covers blast cleaning equipment, tumbling mills and industrial dust control equipment. Brief descriptions are included on centrifugal blast, compressed air blast, blast rooms, blast mills, abrasive cleaners, conveyors and other blast units. Also covered are tumbling mills for cleaning castings, forgings and other products. Dust control units consist of filters, classifiers, conveyors, disposal system and piping.

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19. Material Handling

Syntron Co.—64-page illustrated catalog No. 435 is descriptive of complete line of vibratory material handling equipment. Specifications are given on hopper, bin and chute electric vibrators; hopper level switches; vibratory paper joggers, packers and jolters; vibratory feeders for many applications; feeder machines and batch weighing equipment. Also described are swivel pipe couplings; electric hammers, drills, sanders, grinders and hack saws, and concrete breakers.

20. Cut-Off Wheels

Sterling Grinding Wheels division, Cleveland Quarries Co.—6-page illustrated bulletin on "Cut-Off Operations" discusses abrasive wheel characteristics. Typical specifications and wheel markings are tabulated and recommended wheels are listed for various materials.

21. Welding Electrodes

Alloy Rods Co.—4-page "Comparable Chart of Stainless Steel Electrodes" lists available rods of this company together with A.I.S.I. numbers and corresponding arc welding electrodes of other manufacturers. Also included are chemical analyses of "Arcaloy" electrodes and list of distributors.

22. Metal Spinning

Milwaukee Metal Spinning Co.—4-page illustrated folder on "Spincraft" metal spinning methods discusses ways of forming cylindrical parts from sheet metal without use of dies. Example of spinning is shown in section on construction of "Trane Turbo-Vac" impeller which is formed from bronze and balanced so as to permit rotation at 3600 revolutions per minute.

23. Wire Rope

Macwhyte Co.—12 page illustrated bulletin No. 43-32 is entitled "Wire Rope Breaking Strengths and Weights." Booklet is compiled in accordance with simplified practice recommendation R198-43. Size, weight and breaking strengths are listed for all standard sizes and types of wire rope.

24. Arc Welder

Mid-States Equipment Co.—4-page illustrated bulletin on electric arc welders shows details and gives specifications of eight models designed for heavy duty industrial applications. These transformer type alternating current welding machines are available in ratings ranging from 150 to 500 amperes.

25. Hose Clamps

Punch-Lok Co.—8-page illustrated bulletin No. 120 describes hose band method which uses mechanical device for connecting various kinds of male and female fittings, nipples, menders and pipe to hose. In addition to giving details of method, specifications are given on clamps, special fittings and open end clamps. Special applications of clamps are shown.

26. Power Hack Saw

Sales Service & Mfg. Co.—4-page illustrated bulletin on "Keller" power hack saws gives specifications of No. 3 "Hy-Duty" model which has capacity up to 6¾ x 6¾ inches. Details are also given on wet and dry cut models and bench model. Auxiliary equipment described includes stock rest, welding clamp, saw stand and quick acting vise.

27. Gear Finishers

Michigan Tool Co.—4-page illustrated bulletin No. 900 explains construction and operation of model 900 rack type gear finisher which has capacity of gears up to 8-inch diameter and 2-inch face width, with maximum length between centers of 18½ inches.

28. Metal Saw

Motch & Merryweather Machinery Co.—8-page illustrated broadside, "Triple Chip Method," explains how this cold sawing method works and what it accomplishes. Use of alternate roughing and finishing teeth in segmental blade of saw, combined with cam generated tooth form, are claimed to afford fast cutting under most severe production requirements.

29. Crane Operation

Shaw-Box Crane division, Manning, Maxwell & Moore, Inc.—12-page illustrated instruction booklet, "Controlling Crane Hooks," is written for new operators. In addition to defining purpose of cranes, operation of controls, hand signals, "do's and don'ts" for crane operators and inspection reports are covered.

30. Lathe Operation

South Bend Lathe Works—128-page illustrated operator's handbook, "How to Run a Lathe," 42nd edition contains latest information on operation and care of metal working lathes. It covers such subjects as lathe operation, grinding cutter bits, making accurate measurements, plain turning, chuck work, taper turnings, boring, drilling, reaming, tapping and screw thread cutting. Book is adaptable for use as shop text or apprentice training courses. Price is 25 cents, paper bound.

31. Aircraft Tubing

Summerill Aircraft Tubing Co.—10-page illustrated data sheets Sec. 1-25 to 34 contain data on tapered and formed tubes. Tubing in spun, step, upset end and swaged types are covered in detail. These data sheets are intended for supplementing information contained in aircraft tubing catalog.

32. Welding Positioner

Ransome Machinery Co., Industrial Division—2-page illustrated bulletin No. 196 describes model 25H hand operated welding positioner which handles work weighing up to 2500 pounds with center of gravity 6 inches away from table top. Clutch permits free hand rotation of table top which is T-slotted for clamping of work. Timken bearings assure easy operation.

33. Honing Machines

Micromatic Hone Corp.—8-page illustrated bulletin No. AR-67 shows how "Micromatic Microhoning" generates combined results in one process. Accuracy, stock removal, surface finish and controls used are discussed. Specifications of standard honing machines, tools, fixtures and abrasives are presented.

34. Carbide Tools

Kennametals, Inc.—40-page illustrated catalog No. 43-B contains specifications and list prices on complete line of standard and special Kennametal" steel cutting carbide tools and blanks. General information is included on grade selection, tool and blank specification, chip breakers, grinding instruction, brazing of blanks to tools and typical machining operations.

35. Industrial Furnaces

Mahr Mfg. Co.—6-page illustrated equipment bulletin No. 120-B discusses unit construction of "Mahr" standard heat treaters which are available under fired only or over and under fired. Furnaces provide close, accurate control and uniformity of operation at 1000 to 1800 degrees Fahr. Complete description and specifications of these gas fired units are included.

36. Abrasives

Minnesota Mining & Mfg. Co.—28-page illustrated bulletin, "3-M Products Used in the Victory Program," gives complete information regarding composition and applications of surface coated abrasives, Scotch adhesive tapes, electrical tapes, sanding materials, floor waxes, resurfacing cements and special cements for application to all types of materials such as wood, cloth, felt, leather, mica, rubber and plastics.

37. Grinding Wheel Safety

Norton Co.—24-page illustrated bulletin is entitled, "A Primer on Grinding Wheel Safety." Important facts for operators of grinding equipment are presented graphically so as to impress reader of their importance. "Do's and don'ts" are presented pictorially. Included are table of speeds for grinding wheels and list of maximum peripheral speeds for various types of wheels.

38. Maintenance Methods

Oakite Products, Inc.—12-page "Mill and Factory Maintenance Digest" presents concise data on cleaning, descaling, derusting, paint stripping and other procedures used to simplify and speed up 54 plant maintenance operations. Methods and materials are outlined.

39. Tapping

Cleveland Tapping Machine Co.—8-page illustrated bulletin, "Guide for Production Tapping," contains such useful data as suggested tapping speeds, recommended lubricants, table of spindle speeds, production speeds, basic thread dimensions and tap drill sizes. Information is intended to aid in obtaining maximum output in tapping all types of materials.

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up to 1 inch, tubing and light sections up to 2 inches.

Cutting head of the new machine is practically the same as that on the company's 47 W model. Vises are furnished for straight cuts only or in the combination straight and angle type. The machine is powered by a 5-horsepower motor, the drive being furnished with four V-belts. Height of the machine is 72 inches and it occupies a floor space of 28 x 50 inches.

Electrical Marker

A device for placing numbers, symbols and identifications on soft or hardened steel, alloy steels, other ferrous alloys, wrought iron and cast iron is reported by H. P. Preis Engraving Machine Co., 157 Summit street, Newark, N. J. Designed primarily for freehand marking, it also can be used as an attachment to the company's Panto electrical marker for pantographic reproduction.

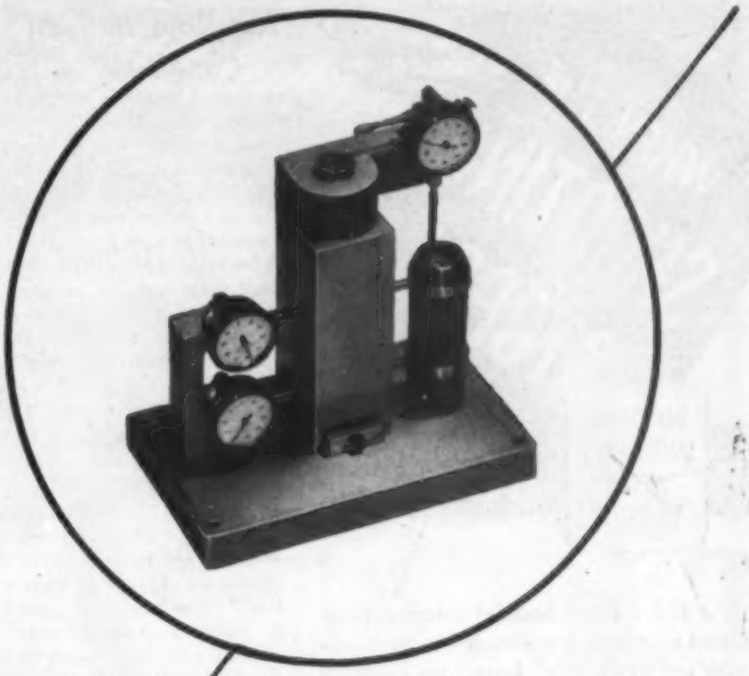
The equipment consists of a special transformer with ten voltage stages controlled by a rotary switch, a hand-held

marking pencil, a ground plate for use with small work and a ground clamp for large work. Voltage selection makes it possible to obtain any desired depth of marking. The marking point is a special long-life heat-resisting alloy and is threaded into the holder at an angle so that it stands vertically to the work when the holder is placed in a normal writing position. Heavy cork insulation and hollow construction permits a constant flow of air through the entire length of the holder, allowing it to remain cool during continuous operation.

Outdoor Floodlight

Greater light spread due to a stippled lens is provided by a redesigned outdoor weather-proof floodlight introduced by Commercial Metal Products Co., 2251 West St. Paul avenue, Chicago. In addition, a special post mounting bracket assures unlimited adjustments.

Reflector of the floodlight features a hard baked-on white "liquid-plastic" enamel surface. Its outer surface consists of baked on "liquid-plastic" grey enamel. The unit is offered in 200 and 300-watt sizes.



SPECIAL GAUGES
by TURNER

Illustrated above is a Special Gauge made by Turner. This gauge is just one of the hundreds of Special Precision Gauges Turner makes for manufacturers who require their own particular type of gauge to check certain precision operations on their production lines. Turner's Engineering Department has played an important part in assisting in the design of these gauges and the Turner Company invites you to write them if you have a checking problem that requires a special built gauge.

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TURNER GAUGE GRINDING COMPANY
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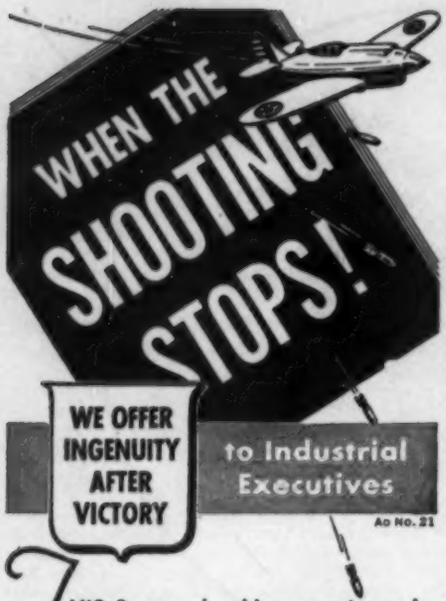
THE HOME OF TURNER PRECISION BUILT GAUGES



THIS 8-page booklet contains published articles representing five business-wise points of view, based on Spriesch activities.

Long before Pearl Harbor, Spriesch commenced making huge quantities of intricate bomb releasing mechanisms for use by Army and Navy Aircraft.

Manufacturing these complete assemblies, is adding greatly to a valuable specialized knowledge we will make available to others in industry.

Busy as we are, we have time to *think* on problems for Making or Bettering anything made from metal for fabrication in our plant or yours, After Victory! A Physicist-Mechanical Engineer of unusual ability consults with us on unusual problems.

The Spriesch "idea-to-manufacturing" service will be rendered along the following lines, in full or in any part:

1. **Ideas to blueprint, to metal; experimental or mass production.**
2. **Special Machines, Tools, Dies, Recommendations for Production.**
3. **Continuous recommendation for Product Improvement.**
4. **Recommendations on *what* to make for peacetime with present equipment.**

Write for Booklet

Industrial Executives interested in knowing more about this unique service please write (on business letterhead) for booklet, "When the Shooting Stops!" Joseph J. Cheney, President.

Spriesch Established 1923
TOOL & MANUFACTURING CO.
Incorporated
22 HOWARD STREET ••• BUFFALO 6, N. Y.

Template Making

(*Concluded from Page 88*)

produced as many times as desired. No inspection of the reproduction is necessary, therefore many hours of checking time are saved. Advantages of this system over photographic methods where a lens is used is said to be elimination of human error in lens adjustment as well as lens distortion. The method also lends itself for work on experimental aircraft since the contact print of the master negative can be made directly on the metal of which the actual part is to be constructed, along with a Masonite reproduction to be used as a form block.

An innovation (on which a patent is pending) that permits the making of a negative of any size through the use of a luminous chemical has been devised by Republic. This method is employed when a part is larger than the 4 x 6-foot maximum obtainable with a plastic negative. The sheet of metal to be used is given a priming coat and is then treated with the chemical which derives its illumination by absorbing the ultra-violet rays of sunlight or artificial light. Next, a masking material covers the entire surface and the layout lines are scribed through. The sensitized sheet from which the template is to be made is then placed on the luminous master layout. The glowing light rays are of sufficient intensity and of that part of the spectrum to expose the light-sensitive material effectively.

Welded Air-Raid Whistle Easy To Install

A method by which any company, requiring air-raid-warning equipment can easily construct such devices is offered by a whistle developed by Hervey N. Beishline of Benton, Pa. The air-raid whistle was built entirely of arc welded pipe and pipe fittings.

Beishline, a steam plant foreman at Magee Carpet Co., Bloomsburg, Pa., was credited by the chief of police as having constructed the most effective air-raid whistle thus far tested. The bellow of the whistle is accomplished by raising and lowering weights. When the weight is lowered, the pitch becomes higher, and as it is raised the pitch is lowered. Steam passes through the whistle at all times.

The bell of the device, as reported to Lincoln Electric Co., Cleveland, is constructed of 4-inch diameter pipe, 14 inches in length, welded to a ½-inch disk at top and with chamfer on inside of bottom. The outside frame, supporting the bell, is of flat iron, measuring ⅜ x 1¼ x 24 inches. A ¾-inch pipe sleeve, cut in half, 3 inches in length, serves as the bell adjustment. The pipe connecting the whistle and the steam supply is 1½ inches in diameter.

In operating the warning, the whistle valve is pulled wide open, then a wire, connected to the bell lever, is pulled allowing about 10 seconds for complete travel before releasing. The operation can be repeated as often as desired. The inventor points out that the weight must be sufficient to return the bell lever and wire to normal position. He also will be glad to furnish details of the quickly fabricated air-raid warning to anyone interested, it is reported.

Produces Pure Copper Rings By Casting Centrifugally

Consistently better quality copper parts for certain electrical apparatus is being obtained by centrifugal casting at General Electric's Schenectady works. Besides providing a much denser metal, the method eliminates the possibility of the occurrence of sand holes and blow holes inherent in sand casting, the company reports.

At Schenectady, the copper is brought up to a temperature of between 1200 and 1250 degrees Cent., about 100 degrees higher than the temperature required for sand casting. Meanwhile, the runner box and die are heated with torches to a temperature of approximately 250 degrees Cent.

After the drosses are skimmed from the surface, the molten copper is poured into the runner box, from which it flows into the spinning die. When more than one crucible is used, the opening between the runner box and die is plugged long enough to prevent any interruption between the charges, thus avoiding the possibility of a cold shot.

The die is kept spinning at about 300 revolutions per minute for 2 minutes. After the casting is removed impurities remaining on the inside of the ring are removed by machining.

ASTM Issues New Standards on Refractories

New standards for air setting refractory mortars; fireclay plastic refractories for both boiler and incinerator services; methods of test for measuring the shrinkage, spalling and workability index of fireclay plastic refractories; and a method for measuring the thermal conductivity of insulating fire brick are included in the latest manual compiled by the American Society for Testing Materials, 260 South Broad street, Philadelphia 2.

Seven specifications on refractories for various types of service are given in the book. It includes two classifications of materials and 16 standards giving various methods of testing, some specifically for fireclay refractory brick, fireclay plastic refractories, some for insulating fire brick and various types of refractory materials.

An important part of the book is the section giving ten industrial surveys of refractory service conditions covering: Open-hearth practice, electric furnaces used in steel manufacture, malleable iron, copper, lead, lime burning glass and portland cement industries' by-product coke ovens and stationary steam boilers.

Gas Carburizing

(*Concluded from Page* 105)

caps which have presented themselves in the gas carburizing process have been met and solved in a satisfactory manner so that these units have been able to perform acceptably in the present national emergency and are finding uses daily in an increasing number of different applications.

The Present Continuous Gas Carburizing Furnace: The following series of photographs shows a number of typical installations which serve to illustrate the details of construction and method of operation as it is being conducted at the present time.

Fig. 7 shows the charging end of a 4-row furnace. The pushers, one for each row, are clearly shown at the right hand side of the picture. The work on trays ready for charging is shown on the table at the left. Attention is called to the variety of work shown in this charge which illustrates the versatility of the furnace. The timing of the "push" is fully automatic and adjustable at will by means of a time clock.

The discharge end of a similar furnace is shown in Fig. 8. Attention again is called to the different class of work being handled. Much of the overhead piping serves to remove the gas fumes from the ends of the radiant tube burners, since, as is readily seen, the furnace is located in the midst of a production plant. The controls operating the discharge doors are shown at the right of the operator.

It is not intended here to convey the impression that the art of continuous gas carburizing is now a closed book with no further improvements possible. Such is certainly not the case. It is believed, however, that the major problems which have come up have been solved in a satisfactory way, and that at present there are no handicaps of vital importance.

There is present a wide degree of adaptability in the units as they are being used at the moment, and this has increased the demand in all those lines of manufacture where high production must be consistent with high quality of product. These units vary in capacity from about 350 pounds to 1000 pounds per hour, depending upon the depth of case produced.

Facts About Wool Felt in War Applications Revealed

"Felt Facts" a new booklet issued recently by Felt Association Inc., New York, tells the story of the manufacture of wool felt and its many applications in engineering and mechanical fields as an alternate for rubber, cork, and other priority materials. It points out the importance of wool felt in improved vibration-isolation, filtering, grinding, polishing technique and uses in applications ranging from minute filters in tiny hypodermic needles to block-buster washers and padding for 80-ton tanks and similar mobile Army equipment.

Ready, Willing and Able

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JOHNSON No. 130-A

Firebox — 7¾" high 13" wide 16½" long

Use for hi-speed steel heat treating. Four-burner, illustrated, offers 1400 to 2000° F., at $295. Six-burner, for 1800 to 2400° F., at $325 Prices are F.O.B Factory

1500° F. in 5 Minutes

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Firebox — 5" high 7¾" wide 13½" long

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JOHNSON Furnaces

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Steel Pot — 14" diameter 20" deep

Lid-lifting mechanism locks in UP position. Heavily insulated — 4½" firebrick backed up with 3½" insulating block. $315, F.O.B. Factory. (Blower Extra.)

JOHNSON Furnaces are ready to ship for 2 weeks' delivery — to help you beat production records. For more than 40 years, Johnson Gas Appliances and Furnaces have aided industrial production and lowered costs.

PATTERNS AND PARTS for ANY Johnson unit ever built are still available. A price sheet will be furnished on request. If the Johnson Gas Appliances you now own need repairs, we'll be glad to furnish them. Write today.

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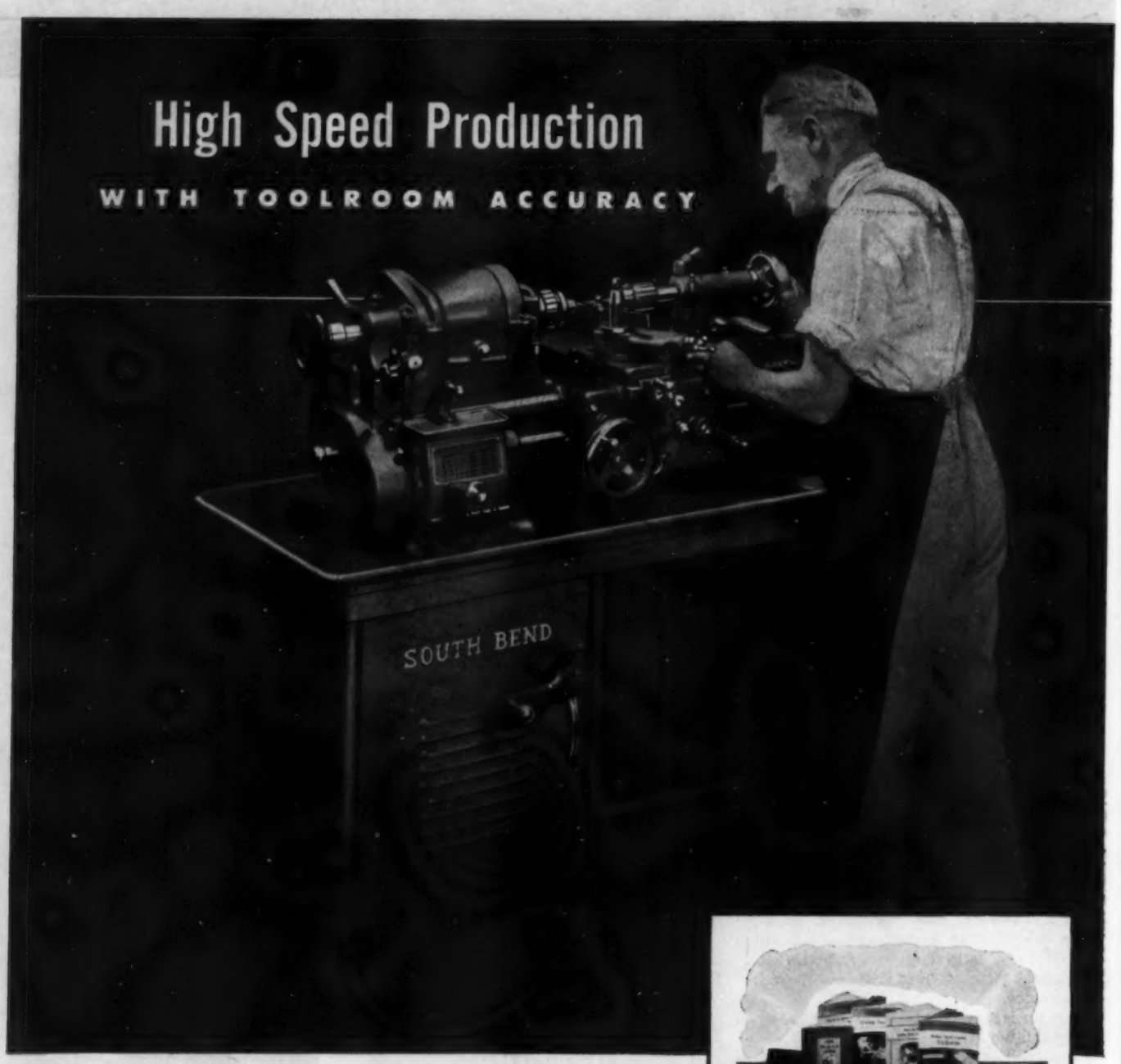
WITH TOOLROOM ACCURACY



War Production demands maximum speed and absolute precision. Both of these requirements are met in hundreds of war plants with South Bend Lathes.

Their rigidity and wide range of spindle speeds permit taking full advantage of the higher cutting speeds possible with tungsten-carbide tools. Their dependable accuracy makes it possible to machine work with such precision that subsequent finishing operations can often be omitted.

South Bend Engine Lathes and Toolroom Lathes are made in five sizes, 9″ to 16″ swings. Write for a catalog and the name of our nearest distributor.

***Use* THESE BOOKS AND FILMS ON LATHE OPERATION**

South Bend training helps — books, sound films, wall charts, and bulletins on the care and operation of a lathe — are available for training new operators. Write for Bulletin No. 21-C.

ARMY E NAVY

SOUTH BEND

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 36 YEARS SOUTH BEND, INDIANA, U.S.A.

Further Steel Needs Face Bulging Mill Schedules

Much readjustment expected in meeting essential demands. . . New capacity will aid situation. . . Pig iron sets all-time production record

DEMAND for plates, sheets and bars dominates the market, with bookings running as far as six months, in the face of substantial tonnage for war purposes not yet scheduled, but some of which will be required in fourth quarter.

To accommodate this added tonnage considerable shifting of schedules is expected. The situation will be helped by entry of new mills during fourth quarter, which will provide additional semifinished steel as well as larger finishing capacity. This is not expected to be sufficient to cope with heavy essential requirements.

Increased electric furnace production, to which considerable bar tonnage has been diverted from open hearths, has eased the situation in that product and deliveries on large sizes now are about the same as on smaller sections.

Several new construction projects in the Middle West have enlivened demand for structurals and reinforcing bars and shape requirements for ships continue fairly heavy.

Steelmaking last week held at 99½ per cent of capacity, slight changes offsetting each other. A year ago the rate was 98 per cent and two years ago 96 per cent. Chicago advanced 1 point to 100 per cent, Cincinnati 4 points to 96 and Detroit 2 points to 92. Pittsburgh receded 1 point to 99 per cent, Wheeling 2 points to 104, and Cleveland 1½ points to 93½ per cent. Rates were unchanged at Youngstown, 97 per cent; St. Louis, 93; New England, 95; eastern Pennsylvania, 96; Buffalo, 90½; Birmingham, 100.

DISTRICT STEEL RATES

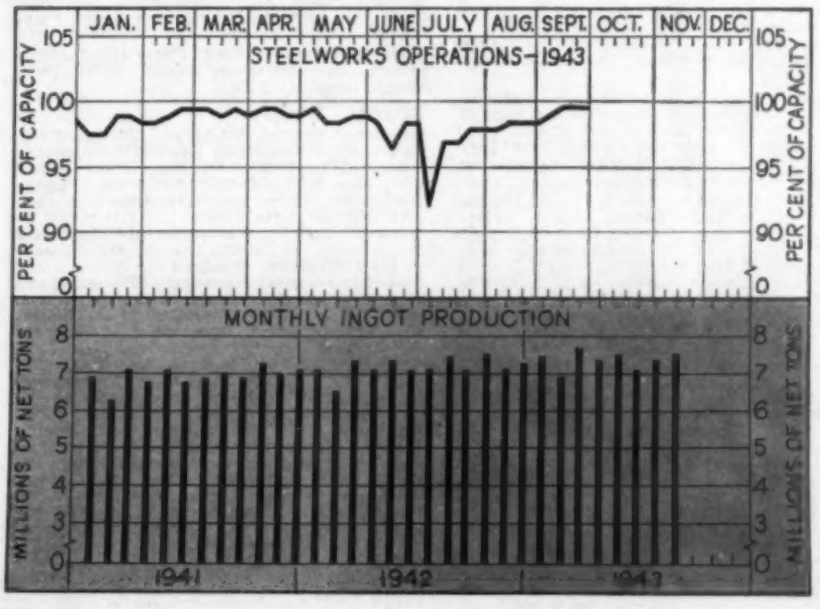
Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Sept. 25	Change	Same Week 1942	Same Week 1941
Pittsburgh	99	—1	96	98
Chicago	100	+1	102.5	101
Eastern Pa.	96	None	96	95
Youngstown	97	None	95	98
Wheeling	104	—2	80.5	91
Cleveland	93.5	—1.5	93.5	95.5
Buffalo	90.5	None	90.5	90.5
Birmingham	100	None	95	95
New England	95	None	100	90
Cincinnati	96	+4	92	83
St. Louis	93	None	92	91
Detroit	92	+2	95	87
Average	99.5	None	*98	*96

*Based on steelmaking capacities as of these dates.

Pig iron output in August established a new all-time high at 5,315,633 net tons, topping the former record made in March by 1432 tons. In eight months this year pig iron production has aggregated 40,681,821 tons, compared with 39,491,105 tons in the same period last year. In August blast furnace capacity was operated at 98 per cent, compared with an average of 96.2 per cent for eight months. Included in the August total are 45,798 tons of ferromanganese and spiegeleisen, of which 439,742 tons have been made so far this year.

Iron ore consumption in August was third highest for any month this year, being exceeded by the alltime record in January and also by March. Tonnage consumed totaled 7,616,801 gross tons, compared with 7,765,174 tons in January. For eight months this year 58,865,224 tons were smelted, compared with 56,271,764 tons in the corresponding period last year. Stocks on hand at furnaces and Lake Erie docks increased during August to 38,571,668 tons, compared with 43,236,172 tons at the same date last year.



Scrap supply in most cases is sufficient for current needs, though some districts do not receive enough to prevent inroads into reserves. Demand shows some increase in the principal grades. Blast furnace supply is short but low phos material is in excess of needs. Yard scrap is being handled slowly because of labor shortage. The forthcoming national drive is relied on to provide a winter supply. Some industrial sources are supplying less than recently.

Average composite prices of steel and iron products are unchanged, finished steel $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Sept. 25	Sept. 18	Sept. 11	One Month Ago Aug., 1943	Three Months Ago June, 1943	One Year Ago Sept., 1942	Five Years Ago Sept., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$58.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.60
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	19.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	14.35

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	1943	Aug., 1943	June, 1943	Sept., 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.48	2.49
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55
Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to 9/32-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron	Sept. 25, 1943	Aug., 1943	June, 1943	Sept., 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.36	25.39
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2 fdry., del. Phila.	25.84	25.89	25.89	25.89
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.65
Scrap				
Heavy melting steel, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting, steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke				
Connellsville, furnace, ovens	$6.50	$6.50	$6.40	$6.00
Connellsville, foundry, ovens	7.75	7.75	7.75	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill. Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncropped, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36; Duluth (bil.) $36.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets only, $42.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O.

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section: 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over, $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars. $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, Galveston, No. 5—9/32 in., inclusive, per 100 lbs., $2. Do. over 9/32—47/64-in., incl., $2.15.
Worcester add $0.10; Pacific Ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c.
(Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6132	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c.
(Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c. Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Eastern Mich. 2.25c; Phila. del. 2.27c; New York del., 2.34c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.67c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Detroit del. 2.85c; Eastern Mich. 2.90c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Detroit del. 3.45c; Eastern Mich. 3.50c; Pacific ports 4.00c.
Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	....
65	7.15c	7.90c	....
58	7.65c	8.40c	....
52	8.45c	9.20c	....
U.S.S., R.C. Grade	10.10c	....	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c;.. Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Josiyn Mfg. Co. may quote 2.30c, Chicago base.)
Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.45c; Eastern Mich. 3.50c, Worcester base 3.35c.
Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.
Tin Mill Black Plate, Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.
Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15 00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.29c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. 2.20c, f.o.b. basing points.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.
Wrought Iron Plates: Pittsburgh, 3.80c

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.27c; Phila., del., 2.215c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export.)
Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth):

Bright basic, bessemer wire	2.60c
Spring wire	3.20c
Wire Products to the Trade:	
Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.55; Pacific ports	3.05c
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland	3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland	3.40c
Woven fence, 15½ gage and heavier, per base column	.67

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Pipe, Tubes

Welded Pipe: Base price in carloads, threaded and coupled, to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	¼	24	3½
¼ & ⅜	59	40½	⅜	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	....	....
1¼"	13	9.26	10.67	....	....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.04	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.39	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Track bolts, 4.75c; do. heat treated, 5.00c. Tie plates, $43 gross ton, base.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base. per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302..	24.00c	27.00c	34.00c	21.50c	28.00c
303..	26.00	29.00	36.00	27.00	33.00
304..	25.00	29.00	36.00	23.50	30.00
308..	29.00	34.00	41.00	28.50	35.00
309..	36.00	40.00	47.00	37.00	47.00
310..	49.00	52.00	53.00	48.75	56.00
312..	36.00	40.00	49.00	....	....
*316..	40.00	44.00	48.00	40.00	48.00
†321..	29.00	34.00	41.00	29.25	38.00
‡347..	33.00	38.00	45.00	33.00	42.00
431 ..	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403..	21.50	24.50	29.50	21.25	27.00
**410..	18.50	21.50	26.50	17.00	22.00
416..	19.00	22.00	27.00	18.25	23.50
††420..	24.00	28.50	33.50	23.75	36.50
430 ..	19.00	22.00	29.00	17.50	22.50
‡‡430F.	19 50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442..	22.50	25.50	32.50	24.00	32.00
443..	22.50	25.50	32.50	24.00	32.00
446..	27.50	30.50	36.50	35.00	52.00
501..	8.00	12.00	15.75	12.00	17.00
502..	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304..	....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. ** Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.
Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.
Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.
Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices, tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.
Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex.	U.S.S.	S.A.E.
⅞-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
Wise county, furnace	6.75- 7.25
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943. †$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic*	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	‡20.38	†19.00	.....	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.68	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del	25.46	24.58	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del. No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%; 50c deduction under 1.75%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese over 1.00%.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $2 per ton, effective May 20, 1943. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick	
(Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60% $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard): 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $10.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33. Ferromanganese (low and medium carbon); eastern zone, low carbon, bulk, c.l., 23c, 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c, 2000 lb. to c.l., 24.40c; medium, 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, bulk, c.l., 79.50c, 2000 lb. to c.l., 80c; central, 81c and 82.50c; western, 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c —low carbon, eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr.

Briquets: Ferrochrome, containing exactly 2-lb. Cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 to c.l., 8.75c; silicomanganese briquets, containing exactly 2 lb. manganese and ¼ lb. silicon, bulk, c.l., 5.80c, 2000 lb. to c.l., 6.30c; ferrosilicon briquets, approximately 5 lb. and containing exactly 2 lb. of silicon, or weighing approximately 2¼ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, ferrochrome, .3c for c.l. and .5c for 2000 lb. to c.l.; silicomanganese, add .25c for c.l., and 1c for 2000 lb. to c.l.; ferrosilicon, add .15c for c.l. and .40c for 2000 lb. to c.l.; western, ferrochrome, add .70c for c.l. and 2c for 2000 to c.l., silicomanganese, add .55c for c.l. and 2c for 2000 lb. to c.l., ferrosilicon, add .30c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk, c.l., 6.65c and 2000 lb. to c.l., 7.85c; central, 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 97% and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicomanganese: Max. 1.50 carbon, bulk, c.l., eastern zone, 6.05c, 2000 lb. to c.l., 6.70c; central, add .25c and 1.00c; western, .55c and 2.00c; f.o.b. shipping point, freight allowed; all prices per pound of alloy.

Manganese Metal: 96 to 98% manganese, max. 2% iron, eastern zone, bulk, c.l., 39.60c, 2000 lb. to c.l., 40c; central, 39.85c and 41c; western, 40.15c and 43.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 35.60, 2000 c.l., 36c; central, 35.85c and 37c; western, 36.15c and 39.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium: ton lots $1.23; less-ton lots $1.25. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium Alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 9.50c; ton lots 10.00c, less ton lots, 10.50c.

Borosil: 3 to 4% boron, 40 to 45% si., $7 lb. cont. Bo., f.o.b. Philo, O.

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Coldrolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[12]	4.715	7.762[23]	6.062[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[13]	4.872[25]	4.072[21]	4.772	7.566[23]	5.866[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[26]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.65[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[13]	4.40[19]	3.75[21]	4.66	7.35[23]	5.65[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.81[1]	4.65[13]	4.30[19]	3.65[21]	4.35	7.35[23]	5.65[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.75[21]	.....	7.45[23]	5.75[23]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.75[21]	4.45	7.556[23]	5.856[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.800[21]	4.659	7.680[23]	5.980[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[13]	5.443[24]	4.443[21]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[13]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[13]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[13]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[13]	4.20[24]	3.75[21]	4.65	5.75[23]	5.85[23]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.85[13]	4.10[24]	3.65[21]	4.55	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[13]	4.337[24]	3.887[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[13]	4.568[24]	3.98[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[1]	3.81[1]	3.81[1]	5.41[1]	3.51[1]	3.86[1]	3.86[1]	5.257[13]	4.46[24]	4.361[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[13]	4.347[24]	4.031[21]	4.931	6.131[23]	6.231[23]
Memphis, Tenn.	3.90[5]	3.95[5]	3.95[5]	5.71[5]	3.85[5]	4.10[5]	4.10[5]	5.25[11]	4.66[24]	4.31[21]	.....	.....	.....
Birmingham (city)	3.50[5]	3.55[5]	3.55[5]	5.83[5]	3.45[5]	3.70[5]	3.70[5]	4.75[13]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham (country)	3.40[5]	3.45[5]	3.45[5]	5.83[5]	3.35[5]	3.60[5]	3.60[5]	4.75[13]	4.78[24]	4.43[21]	.....	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[13]	4.95[19]	4.60[21]	5.00	.....	.....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[13]	4.95[19]	4.60[21]	.....	.....	.....
Houston, Tex.	3.75[5]	4.25[5]	4.25[5]	5.50[5]	3.75[5]	4.30[5]	4.30[5]	5.25[13]	5.43[19]	4.50[21]	.....	.....	.....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[13]	7.15[5]	5.70[21]	.....	9.55[23]	8.55[23]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[13]	7.55[19]	5.55[21]	.....	9.80[5]	8.80[5]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[13]	7.45[19]	5.45[21]	.....	.....	.....
Tacoma	4.20[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.25[8]	5.45[8]	5.70[8]	6.63[24]	5.75[21]	.....	.....	.....
Seattle (city)	4.20[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.35[8]	5.45[8]	5.70[8]	6.63[24]	5.75[21]	.....	.....	8.00[5]

*Basing point cities, with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in amendments Nos. 10 to 16 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base.

Ores

Lake Superior Iron Ore
Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore
Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore
Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore
(Equivalent OPA schedules):
Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.
(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1	52.80
less $7 freight allowance	

Manganese Ore
Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	100.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per G T	Bars per 100 lb.	Billets per G T
	Chemical Composition Limits, Per Cent									
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	.....	.....
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.18-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9255	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55-.65	.75-1.00	1.10-2.20	.10-.25	.....	.....	.65	13.00	.....	.....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	.....	.....
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9545	.43-.48	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

					ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES									
					Low Phos. Grades									
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Foundry Steel 2 ft. and less	Foundry Steel 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22 00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†18.35	12.85	13.85	14.85										
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati includes Newport, Ky. St. Louis basing point includes Granite City, East St. Louis and Madison, Ill. San Francisco includes South San Francisco, Niles and Oakland, Calif. Chicago includes Gary, Ind. Claymont, Del., includes Chester, Pa.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices: maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah, Arkansas, Nebraska, Kansas. Delivered price may exceed by not more than $7 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $7 the nearest basing point price. Colorado is remote for Colorado consumers only.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.09c, Del. Conn., less carlots 12.12½, refinery; dealers may add ¾c for 5000 lbs to carload; 1000-4999 lbs. 1c; 500-999 1¼c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 12.25c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 14.25c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, corroding or chemical, 6.40c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York State, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ¼c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 14.00c per lb. except as follows: Low-grade piston alloy (No. 122 type) 13.50c; No. 12 foundry alloy (No. 2 grade) 13.50c; chemical warfare service ingot (92½% plus) 13.50c; steel deoxidizers in notchbars, granulated or shot, Grade 1 (95-97½%) 13.75c, Grade 2 (92-95%) 13.50c, Grade 3 (90-92%) 13.00c, Grade 4 (85-90%) 12.50c; any other ingot containing over 1% iron, except PM 754 and hardeners, 13.50c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb.; add 1c for special shapes and sizes, including 3-lb. ingot and 12-lb. round ingot; incendiary bomb alloy 23.40c, 50-50 magnesium-aluminum 23.75c, ASTM B80-41T No. 11 25.00c, ASTM B94-40T No. 13 25.00c, all others 23.00c. Prices for 100 lbs. or more; for 25-100 lbs. add 10c; for less than 25 lbs. 20c; incendiary bomb alloy f.o.b. plant any quantity; carload freight rate allowed all others for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1¼c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, 51.87½c; Grade C, 99.65-99.79% incl., 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl., 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk, carlots, f.o.b. Laredo, Tex., 99.0-99.8% grade 14.50c, 99.8% and over (arsenic 0.05% max.; no other impurity to exceed 0.1% 15.00c. Add ¼c for less-carlots to 10,000 lbs.; ½c for 9999-224 lbs.; 2c for 223 lbs. and less.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz. $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $15 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $2.11 lb.; 100 lbs. or more on contract, $1.50 lb.

Indium: 99.5%, $10 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $36 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A, B 5% 26.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.61c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 26.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 28.75c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c, manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Bare, soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.50c Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu; 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A. B. 5%	11.00	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	8.000	7.500

Other than Brass Mill Scrap: prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 8.00c; Muntz metal condenser tubes 7.50c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.ob. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c; add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Clean and lubricate your chain!

LENGTHEN ITS LIFE

Here's one good method. Clean your chains regularly. Wipe the links clean, then apply grease or heavy oil mixed with graphite. • Note this exception: Chains should be cleaned but not be lubricated when they come in contact with dirt and sand. • Select good chain (of course we recommend American), care for it regularly, and you'll obtain excellent service. • The highest possible preference rating should be obtained and shown on orders placed for chain.

• USE WELDLESS CHAINS

Weldless Chain is being substituted successfully in many applications, for smaller sizes of welded chain and manila rope. From time to time we have open equipment for manufacturing the following types of weldless chains and attachments: Tenso, Lock-link, Jack, Register, Safety, in steel and brass; American Pattern, in steel; Sash, in steel and bronze. Attachments —"S" hooks, rope snaps, swivel snaps, rings and special designs. Write for information.

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AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT - CONNECTICUT

In Business ACCO *for Your Safety*

Sheets, Strip . . .

Sheet & Strip Prices, Page 116

Of all major products sheets appear most extended on delivery. Some hot and cold-rolled is still available in first quarter but some producers are booked solidly into second quarter. Orders exceed production and backlogs continue to mount.

Pittsburgh — Heavy buying continues to build up backlogs of unscheduled orders on nearly all sheet mills. Most critical item for the moment is drum stock for the Army but no mill time or steel has been found for several other items. This results from volume of plates demanded by the Maritime Commission. Plates, sheets and strip for tinning account for most production of continuous sheet mills. Because of pressure of the ship program retrenchment scarcely can be expected there and the sheet program is critical. In tin plate some reduction might be made. Increased supply of semifinished would allow increased rolling mill schedules for sheet production.

Philadelphia—An important sheet seller in the East can promise nothing on hot-rolled sheets before July, due mainly to heavy orders for drum stock. The same interest is booked well into May on cold-rolled. Galvanized sheet deliveries are advancing steadily. Some January tonnage still is available but most promises now fall into February. Stainless steel, electrical sheets and some other specialties still can be had for November.

New York—While most sheet producers are well booked through first quarter some new programs apparently will have to be worked into schedules for that period. One involves about 34,000 trucks and 14,000 trailers, production expected to start in first quarter, although no sheets have been placed. Hot-rolled pickled sheets are expected to make up most of this tonnage. Of 23,000 medium and 11,000 heavy trucks manufacturers on the eastern seaboard have been called on to build about 2500 trucks and 400 trailers.

Boston — Sheets, notably hot-rolled, are becoming as tight as plates, some producers being booked into June and July. Considerable displaced fourth quarter CMP tonnage is still unscheduled as a result of increased plate directives and some fourth quarter allotments of both sheets and plates are appearing, with buyers finding difficulty in placing them for required delivery. Most hot strip mills are sold through first quarter.

Cincinnati—Sheet mills in this district experience no lessening of heavy ordering which developed recently. Deliveries now average six months. Little tonnage is being cancelled and this does not help the general tightness as other needed tonnage is substituted. Local equipment is being pushed beyond rated capacity and only one open hearth is idle for repairs.

Plates . . .

Plate Prices, Page 117

Maritime Commission needs for the ship program continue to dominate the steel plate market and new mill capacity expected to be in operation soon may not be sufficient to meet demands. Orders

now exceed production by considerable margin.

Philadelphia — New plate buying is easier but orders still exceed output and backlogs continue to mount. Most sellers still can make late first quarter shipment. While building up order books for second quarter producers are faced by changes in schedules during the next few weeks because of new directives. Jobber tonnage will suffer as a result. Warehouses are showing greater interest in light plates, apparently in an effort to balance stocks. Through the summer principal pressure was for heavier gages.

Pittsburgh—Although new plate rolling facilities will be in operation in a few weeks their output will be short of demands by the Maritime Commission and the Navy. Distribution of steel available for these mills and converted sheet mills is in question. Sheet needs have become almost as critical as for plates, thus crowding the latter. Semifinished supply will be increased somewhat in this program and if this is in excess of rolling capacity of new mills some will be available for existing mills.

New York—Movement of plates into this district continues high for shipyards and also for fabricators on sub-assembly jobs, much of it for ships. Jobbers, as well as fabricators, are engaged in considerable burning and welding operations and are pressing mills for tonnage. Plate producers generally are booked solidly for six months and in some cases beyond, forcing buyers to press warehouses for nearby requirements beyond their ability. Producers find buying is easier as a result of distant delivery and difficulty of consumers to figure requirements for second quarter.

Boston—While plate mills are scheduled into March, sizable tonnages remain to be specified against directives for first quarter and some for fourth, notably by the Navy. Prospective requirements for new and supplemental programs, including octane gasoline units, may also break into schedules within the next few weeks.

Bars . . .

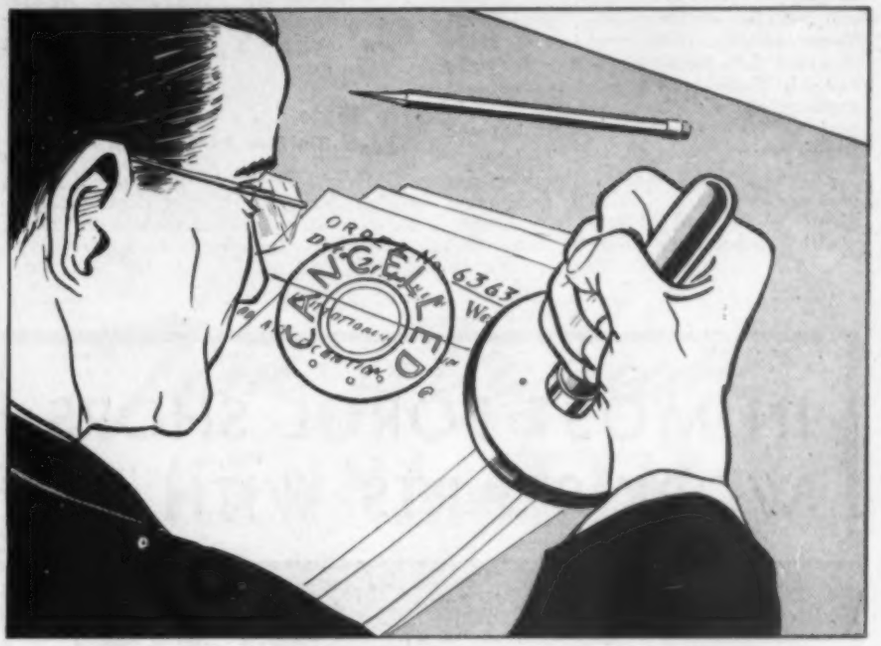
Bar Prices, Page 116

Easier conditions are apparent in steel bars, ascribed to larger electric furnace capacity and to cutbacks in the shell program. Large sizes now are no more delayed than smaller, in marked contrast to recent delays.

New York—Except for hot-rolled alloy bars little bar tonnage is available for shipment this year. Most sellers of carbon bars have little to offer before February and some are well booked for that month. Only in the case of angle bars does there appear to be any capacity left for this year. Relative easiness of hot-rolled bars is attributed to increased electric furnace capacity, the recent cutback in the armor-piercing shell program and substitution of carbon for alloy steel for various requirements, including even some aircraft needs.

Boston — Bar demand is easier and slower in New England, with some consumer allotments reduced. Production directives of cold drawers also have been cut. Meanwhile, bar consumption has not declined in line with the slack in buying as users are drawing more heavily on inventories. While there are some cutbacks in bar needs the decrease in

ARMISTICE WHISTLE
AND THE INEVITABLE



Ability to Absorb Impact Depends on Soundness of Financial Structure . . .

WARTIME activity with its great strides in new developments and rate of production has greatly accelerated the speed of obsolescence and wear and tear on industrial facilities.

It's just as urgent and patriotic to be ready for the new and better world Victory will bring as it is to speed the production of the modern implements of war, since both can be accomplished without interference,—one is useless without the other.

By replacing book values of idle or unprofitable facilities, whether it be a complete plant or a single item of equipment, by earnings from operating units, you can better serve our returning victorious boys in the armed service, both as customers and employees.

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HETZ CONSTRUCTION COMPANY
WARREN, OHIO

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BUILDINGS — EQUIPMENT — LAND — INVENTORIES — INTANGIBLES

buying is due more to use of inventories.

Philadelphia — Bar demand appears somewhat easier, deliveries are not as extended and most producers can offer hot-rolled bars for February in a greater range of specifications, ascribed in part to cutbacks in the shell program, with concentration on fewer sizes. As a result large rounds and flats are more easily obtained than formerly. Some producers can ship these about as soon as small and medium sizes. Easing may be due in part to WPB efforts to divert tonnage from open-hearth to electric furnaces.

Boston—Reductions in allotments for cold-drawn bars and cuts in production directives of cold finishers reflect substantial inventories and a somewhat easier bar situation in New England. Most of the latter have not been specifying all tonnage allotted for some time but have become well loaded. Consumption has not declined to the extent the drop in specifications would indicate and forward orders for late fourth quarter presage resumption of volume shipments when current inventories are worked down.

Tin Plate . . .

Tin Plate Prices, Page 117

Pittsburgh—Heavy demand for plates, which shows no signs of declining, plus an increasingly critical situation in sheets, particularly for drum stock, gives rise to rumors here that the tin plate program may be cut back in order to provide additional steel for sheet production. To some extent rolling capacity is an important factor but the supply of semifinished for the most part controls the volume of plate, sheet and tin plate.

Operations in tin mills are about 60 per cent of capacity. A fair stock of cold-reduced strip in coils is on hand to maintain operations and there is also a fair tonnage of finished plate both at mills and can factories. However, in view of large consumption, stocks are not deemed above normal and it is certain that if there is a cutback it will be reflected almost immediately in a reduction in packing activities on certain products.

Rails, Cars . . .

Track Material Prices, Page 117

Further releases by the War Production Board have brought the domestic car building program for this half up to more than 17,500, an increase of more than 2000 recently. Practically all of the added equipment is of composite design so that steel requirements will be relatively small; at the same time, with producers generally tightly booked ahead for several months there is question as to where the necessary steel is coming from. Producers are in position to furnish shapes in November but are in bad position on plates and bars.

United States district court at St. Louis has granted permission to the Missouri Pacific to buy 500 hopper cars for its own lines, 200 for a subsidiary, the New Orleans, Texas & Mexico, and 100 stock cars for International & Great Northern, another subsidiary. Permission was also granted for purchase of 51,500 tons of steel rails, with sufficient accessories.

Estimates are being prepared for the 1944 rail program and no substantial change from this year's requirements is seen. Rail mills are filled, including large tonnages of shell steel. Of rail production about two-thirds will be for domestic needs and the remainder for export, following the pattern set this year. This provides only about 70 per cent of domestic needs and carriers hope allotment of steel for rails may be increased.

Structural Shapes . . .

Structural Shape Prices, Page 117

Pittsburgh—A dull market is enlivened only by scattered new war plant jobs. Shapes for shipbuilding remain the mainstay of structural mills and bookings promise continued activity for months. A fair volume is required for export, mainly for the Army.

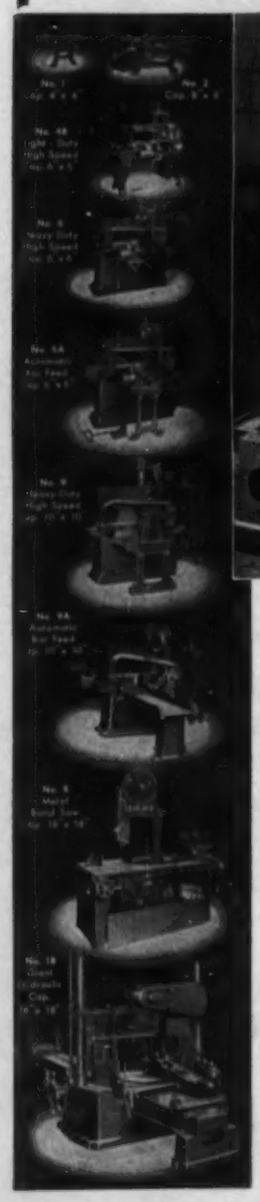
Philadelphia—Shapes still are being offered for November delivery, with ship requirements accounting for the larger part of tonnage now being rolled. A Navy depot at Red Bank, N. J., 120 tons, is pending.

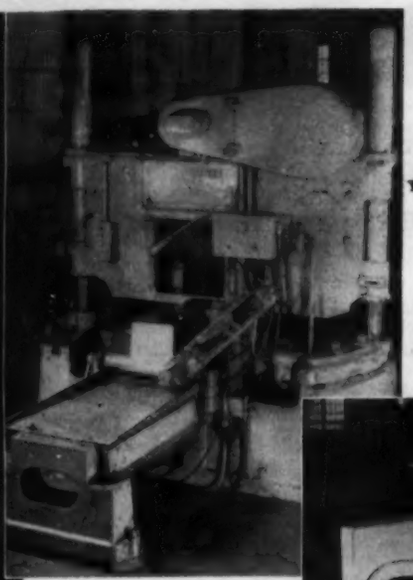
Chicago — First important structural inquiries in some time for two aluminum extrusion plants, at Columbus, Nebr., and Hammond, Ind., requiring 6400 and 3600 tons of shapes, respectively, bids Sept. 27.

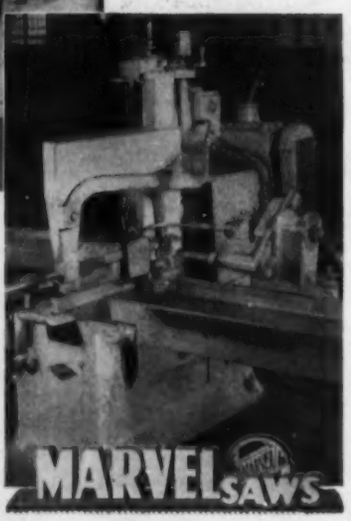
Boston—Deliveries of shapes for the Victory ship program have started and will increase in volume through fourth quarter. Most mills now promise November delivery. A Maine shipyard has closed on 6000 tons for November and

IN MOST FORGE SHOPS WORK STARTS WITH . . .

MARVEL SAWS







Sawing off billets is heavy duty work and in most forge shops, as in most other places where sizes are large and cutting jobs tough, you will find MARVEL Hack Saws. These will usually include one or more high speed heavy duty all-ballbearing MARVEL No. 6 or No. 9 Production Saws for automatically cutting off quantities of identical lengths and at least one MARVEL No. 18 Giant Hydraulic Saw to cut-off the largest sizes (18" x 18") and toughest alloy steels in absolutely minimum time.

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Eastern Sales Office: 225 Lafayette St., New York

December, part of the 115 Victory ship construction program for next year. Except for ships demand is light.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 117

Demand is light for reinforcing steel and tonnage is declining slowly. Some government agencies reportedly are favoring rerolled rail bars to new billet steel but total tonnage would not satisfy either type.

Philadelphia—Reinforcing bar demand is negligible, most tonnages being in less than carloads.

Pittsburgh—New business in reinforcing steel is developing slowly. A few war plants still are under construction, including some aluminum and aircraft plants, with a few public jobs, roads and small bridges. Due to lag in ordering and specification procedure some orders validated for third quarter were not placed in time for that delivery. Efforts now are being made to extend them into fourth quarter to meet needed deliveries. As a result several mills have steel to deliver but no validated orders. Automatic extension of validations is being sought to relieve this situation.

Chicago—Several new projects have brightened the situation in reinforcing bars. Two aluminum extrusion plants have been let, at Hammond, Ind., and Columbus, Nebr. A housing project in the Calumet area is estimated to need 800 tons of bars. Three hospital projects are pending, bids to be taken in October.

Scrap . . .

Scrap Prices, Page 120

While melters in some districts are using scrap from reserves, current receipts in others are sufficient for the high rate of steel production. Much hope is placed in the fall drive, which is expected to provide an increased tonnage for winter.

New York—While some further allocations of steel scrap have been made for shipment to the Middle West, dealers assert collections are shrinking. Manpower shortage is the principal factor, though less industrial scrap is coming out, notably turnings, but there is an increasing accumulation of alloy material.

Philadelphia—Although there appears to be no pressure for heavy melting steel eastern mills generally continue to dip into reserves. Only grades in strong demand are heavy breakable, as has been the case for some time, and turnings, now coming out in less volume than a few months ago. Low phos, scarce early in the year, now meets all needs in this district and is being shipped increasingly to the Middle West under government allocations. One such tonnage is reported moving recently to a point in Michigan. Yard scrap is accumulating slowly, due to manpower shortage. Material reaching yards in the national drive promises to move slowly to consumers under present labor shortage.

Pittsburgh — Demand for all scrap grades except alloy is increasing and supplies are declining. Blast furnace stocks are below normal at all points with prospects poor for additional supplies. Allocations of this material are not expected as diversion would interfere with pig iron production at some points. Most mill purchasing agents believe drive scrap will be fairly heavy material and they are depending on dealers to process it promptly.

Cleveland—Melters continue to use some scrap from reserves as heavy steel production requires more than current receipts. Industrial scrap is in fair volume, though slightly under recent levels. Blast furnace demand for borings and turnings exceeds supply. Electric furnaces appear well stocked.

Chicago — Scrap flow continues to taper. Dealer inventories are low and material moves through yards quickly. Borings and turnings are in less volume. Railroad offerings are light. Most mill receipts are industrial scrap shipped direct.

Cincinnati—Disposition of alloy scrap is the principal trouble for dealers and some fairly large tonnages of nickel and molybdenum material have been difficult to move. Heaviest demand here is for No. 1 cast, with supply light. Blast furnace and open-hearth grades are sufficient for current needs.

Pig Iron . . .

Pig Iron Prices, Page 118

Foundry melt continues to decline as labor shortage prevents normal operations. Some cuts have been made in

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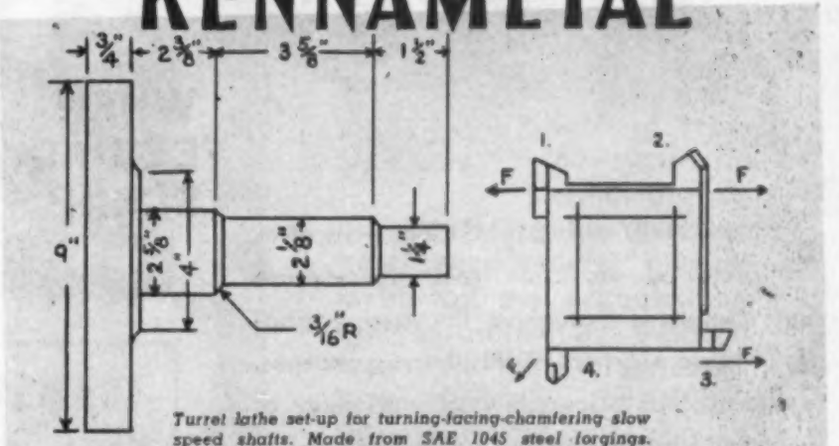

Turret lathe set-up for turning-facing-chamfering slow speed shafts. Made from SAE 1045 steel forgings.

OPERATION	TOOL	GRADE	FEED	DEPTH	R.P.M.
TURN	0 10T80	KM	.021	1/8" to 1/2"	350
FACE	2) 12T80	KM	.021	1/8"	133
CHAMFER	3) 15T50	KM	HAND	—	350
RADIUS	4) 6T50	KM	HAND	—	350

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foundry allocations to meet increasing demand for basic iron.

Philadelphia — Greater pressure is noted for basic iron and in less degree for foundry grades. Foundry melt is not as heavy as a few weeks ago but various foundries were cut down on allotments for September as a result of pressure to supply basic and now are short of iron for pressing deliveries.

New York—Most pig iron sellers here expect lighter allocations for October as foundry melt lessens, attributed more to labor shortage than decline in war business. Some foundries operate only four days a week, often reflecting difficulty in getting war work, though lack of workers is the greater factor. Sellers report better movement to South America. Orders are almost all small but licenses are being issued more freely. This iron moves to most South American countries except Argentina, with Brazil and Chile taking most.

Boston—Pig iron distribution by allocation through the Metals Reserve Co., which includes Mystic's production, is covered by an individual contract to Nov. 30 and some consumers have not signed, some deliveries being held back or delayed until contracts are closed. There is continued resistance to the $2 premium for Mystic iron, indicated by applications for Buffalo material, which are frequently ignored in allocations.

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for CARBON RECOVERY

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THE UNITED STATES GRAPHITE CO.

SAGINAW, MICHIGAN

U. S. A.

Iron Ore Consumption Shows Gain in August

Iron Ore Prices, Page 119

Cleveland — Consumption of Lake Superior iron ore in August in the United States and Canada aggregated 7,616,801 gross tons. This compares with 7,155,703 tons in July and 7,155,202 tons in August, 1942. Cumulative consumption for 1943 to Sept. 1 was 58,865,224 tons, compared with 56,271,764 tons in the comparable period in 1942. Figures are by the Lake Superior Iron Ore Association, Cleveland.

Stocks on hand at furnaces and Lake Erie docks as of Sept. 1 totaled 38,571,667 tons, against 32,388,932 tons July 1 and 43,236,172 tons on Sept. 1, 1942. Furnaces in blast in the United States Sept. 1 numbered 174, compared with 173 a month earlier and 170 on Aug. 1, 1942. All nine Canadian stacks were in production at each of these three dates. Total stacks operating in both countries Sept. 1 numbered 183, compared with 182 Aug. 1 and 170 on Sept. 1, 1942.

Arrangements are being made by ore shipping interests to open navigation as early as possible in 1944, to avoid the late start encountered this year. Two car ferries are to start ice breaking in St. Marys river in March, that channel having been the cause of delay early this season, after Lake Superior ice had been mastered.

Warehouse . . .

Warehouse Prices, Page 119

Steel consumers are pressing warehouses for deliveries on fourth quarter allotments, now that they are permitted to take shipments for that period. Many have used their allotments for third quarter and placed their orders immediately after Sept. 15, the date this was allowed. September buying, as a result, is considerably heavier than in August.

New York — Particular pressure on warehouses is noted for plates and sheets, with distributors unable to get sufficient steel to meet demand. Plate inquiry, while reflecting heavy shipyard demand, also shows continued expansion of requirements for fabrication of products and parts formerly made of castings and forgings. Carbon bars, both hot and cold-drawn, are moving actively, though a lag in hot-rolled alloy steel bars continues.

Chicago—Availability of idle and excess steel has slowed up warehouse inquiries to some extent but practically all could use more steel if they could get it. Receipts from mills show a slight upward tendency.

Cleveland—Improved delivery on many lines of steel has made the situation of warehouses somewhat better, though still far from ideal. Inventory has been improved but demand from consumers has increased as mills are unable to fill orders for early delivery on needed material. On large bar rounds and flats the situation is decidedly easier than recently.

Nonferrous Metals . . .

Nonferrous Prices, Page 121

New York—As a result of recent buying, copper producers have disposed of practically their entire October output.

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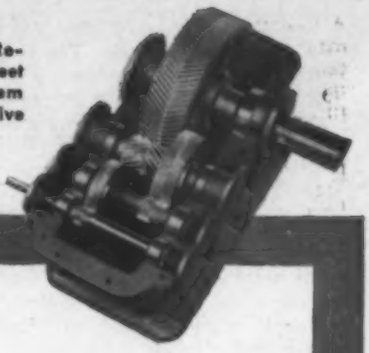

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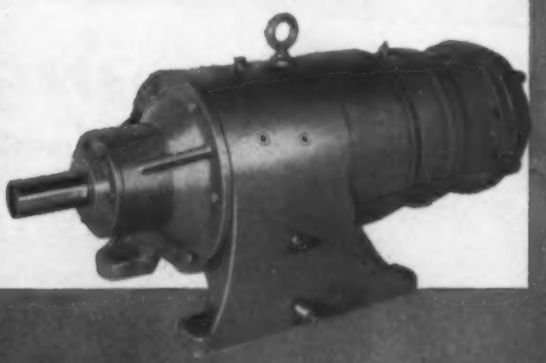

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MAKING ALL TYPES OF GEARS AND GEAR REDUCERS

A new form of copper allocation certificate has been brought into use with procedure simplified inasmuch as it requires no presentation of the actual certificate for endorsement.

The Weirton Steel Co. is reliably reported to be planning the erection of a foundry for the production of 10,000 tons of brass ingots monthly to meet eventually its requirements for rolling brass strip, a grade used heavily in small arms ammunition.

The Zinc Producers Advisory committee is to meet with War Production Board zinc officials Sept. 30 and likely will discuss the advisability of doing away with the endorsement of allocation certificates, following the procedure recently inaugurated in copper. Meanwhile, zinc demand continues relatively easy. Further accumulations of high grade zinc are reported, although this situation may be brought into better balance shortly by diverting some production from high grade to prime. Lead buying likewise is easy.

Canada . . .

Toronto, Ont.—Buying in the Canadian steel markets has increased, resulting in booking of practically all mill capacity to the end of the year and on some materials extending backlogs well into first quarter. Canadian mills are still hampered by labor shortage and the possibility of shortage of coke in some areas, with the result that production schedules are not moving up as rapidly as expected.

New orders for plate were comparatively dull last week, as mills already are fully booked for the remainder of the year. The steel controller is carrying additional big tonnages on war account which are being released from time to time.

More action has developed in sheets and mill representatives reported a heavy outpouring of orders for black and galvanized sheets, which absorbs all output through December, with delivery dates now set into late January and February.

A minor flurry of orders has developed in carbon and alloy bars. War plants still are well stocked on bars and no shortages in either carbon or alloy grades have been reported for some time.

More anxiety regarding supply of scrap iron and steel is developing and it is stated that mills and other consumers will enter the winter with stocks only about 50 per cent of those for the same season last year.

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Steel in Europe . . .

London—(*By Radio*)—Steelmakers in Great Britain are experiencing heavy call for plates and sheets for shipbuilding and armaments. Output of special and alloy steels is being increased greatly. Pig iron supply is meeting all needs.

STRUCTURAL SHAPES . . .

STRUCTURALS PLACED

5000 tons, aluminum extrusion plant, Memphis, Tenn., for Reynolds Metals Co., to Virginia Bridge Co., Roanoke, Va.; Giffels & Vallet Inc., Detroit, engineer.

350 tons, machine shop extension, Todd Ship Building Co., Brooklyn, through George A. Fuller Co., New York, contractor, to American Bridge Co., Pittsburgh.

STRUCTURALS PENDING

6400 tons, aluminum extrusion plant, Columbus, Neb., for Anaconda Copper Mining Co., New York; bids Sept. 27.

3600 tons, aluminum extrusion plant, Hammond, Ind., for Phelps Dodge Copper Products Corp., New York; bids Sept. 27.

120 tons, Navy depot, Red Bank, N. J.; Caldwell, Wingate Co., New York, general contractor.

REINFORCING BARS . . .

REINFORCING STEEL PENDING

850 tons, state hospital, Evansville, Ind.; general contract to Gust K. Newberg Construction Co., Chicago; bids Sept. 8.

800 tons, federal housing project, Calumet area, Chicago, for Chicago Housing Authority; Shaw, Naess & Murphy, architects; bids Oct. 15.

100 tons, second story factory addition, Edward Katzinger Co., Chicago; bids Sept. 20.

RAILS, CARS . . .

FREIGHT CAR AWARDS

Atchison, Topeka & Santa Fe, 200 composite flat cars, to Pullman-Standard Car Mfg. Co., Chicago.

Wabash, 350 box cars and 175 gondola cars, to own shops.

Midland Valley, 75 gondola cars, to Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill.

Chicago, Burlington & Quincy, 400 hopper cars, to own shops; in addition to 600 previously noted.

Chicago, Milwaukee, St. Paul & Pacific, 100 hopper cars, to own shops; in addition to 400 previously noted.

Indiana Harbor Belt, 425 box cars, to Despatch Shops, East Rochester, N. Y.; in addition to 575 previously placed.

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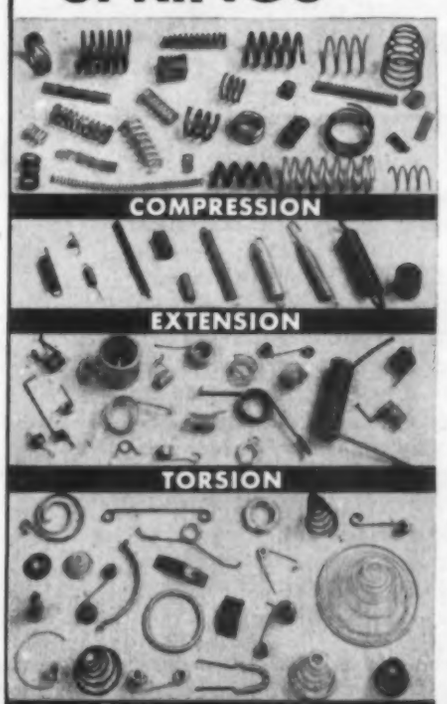

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WPB Restricts New Orders to Needs Used Tools Cannot Fill

New York — While there is considerable potential demand, builders of machine tools report difficulty of buyers in obtaining priorities. The "screening" process whereby WPB is holding buying to a minimum and is active in diverting idle used machinery to meeting new requirements, is having marked effect on sales of new equipment. WPB agencies have lists of idle equipment in their respective districts and are making sure that items on these lists will not meet new requirements, before approving purchases of new machinery. Changes in the war program have released considerable equipment in some districts, with a result that the lists of idle equipment are expanding rather than contracting.

At the same time, some substantial new buying is in prospect. A large truck program is under contemplation with one eastern builder negotiating for additional new machinery to meet his share of the program. It is understood that truck manufacturers in various parts of the country will participate.

An eastern builder of airplane engines also is negotiating for considerable new equipment for a new and heavier type model. A railroad equipment builder in the East, noted recently as having received a contract for building approximately 8500 caterpillar tractors and bulldozers, has a list of machines pending.

Seek Used Tools First

Washington — A comprehensive program for redistribution to essential uses of upwards of an estimated billion dollars worth of used or idle machinery and equipment, much of it now owned by the government, has been announced by the War Production Board.

The huge "brokerage-without-fee" business, organized by WPB's Redistribution Division, is to be a decentralized operation, conducted by the staffs of WPB regional offices. An innovation will be negotiated sales, under OPA price regulations, of government-owned equipment. Such sales will be made to ultimate users certified by WPB to be eligible to purchase. Sales of government property to dealers will continue to be made on the customary bid basis.

Inventories of more than 55,000 types of machinery and equipment, available for purchase by anyone who qualifies under existing regulations applying to used or idle production equipment, will be filed in WPB regional offices. These inventories are being compiled from reports from used equipment dealers, voluntary listings by user-holders, the War Department, Treasury Procurement Division, Defense Plant Corp. and other government agencies. In all, some ten million pieces are expected to be listed, ranging from WPA sewing machines to industrial boilers and manufacturing equipment rendered idle by program changes.

When applications for authority to purchase new equipment are received by WPB field offices, they will be checked against inventory lists and the applicant put in touch with owners of available equipment. When sales are consummated, following this procedure, they will be the result of negotiation between buyer and seller, subject only to OPA ceiling prices. Under recent WPB orders, applications for authority to purchase many types of new equipment must be accompanied by certifications to the effect no used equipment is available.

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Precedent Unsaluted At Kaiser Steelworks

(*Continued from Page 75*)

shop occupies a steel building, 64 x 128 feet.

Annual output of the Fontana plant is broken down as follows:

Product	Net Tons
Pig iron	432,000
Ingots, carbon	450,000
Ingots, alloy	225,000
Plates	300,000
Structural shapes	90,000
Bars and strip up to 16" wide and rods ¼ to ½-inch	82,000

Comment frequently is heard up and down the coast that Kaiser's plant at Fontana is in for some hard sledding. Where are the products coming off his

"HERCULES" (Red-Strand) Preformed Wire Rope can help you keep production in high gear. Its easy handling, smooth spooling, and long life insure maximum hours of work for each pound of steel used. It saves while it serves. Available in both Round Strand and Flattened Strand Constructions.

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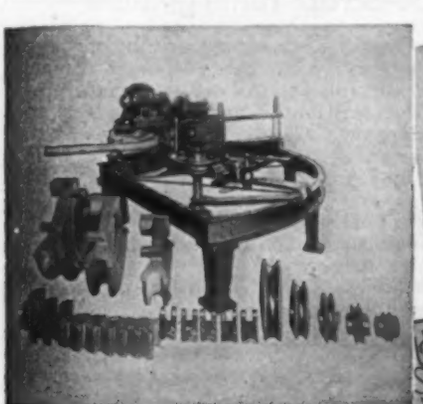

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mills going to be sold? What will happen to the plant when the iron ore supply becomes exhausted? Invariably, a dozen and one other questions usually follow.

In the first place there has been a steady growth of population in the west with a large number of people being concentrated within various radii of Los Angeles and San Francisco, as follows:

Radius, miles	Total population	Per Cent of Calif.
25	3,238,500	57
50	3,882,300	68
100	4,696,300	83
150	5,134,000	91

Based on the 1940 census and including the states of Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon and California, the west has a population of 13,883,265 people. With the average American accounting for 600 pounds of steel annually, this is equivalent to 4,164,979 tons of steel.

From these data it would seem that the cry of alarm over the consumer market is premature.

According to the U. S. Geological Survey there are deposits of iron ore within less than 200 miles of the Fontana plant; enough high-grade ore is in sight to supply a modern 1000-ton stack for more than 100 years. Southern California iron ores have an iron content of 60 to 67 per cent and can be mined by open-pit methods the year round. The survey estimates Pacific Coast iron ore resources between 300,000,000 and 700,000,000 tons; engineers state there are 400,000,000 tons in Southern California and a similar quantity tributary to this area in Western Mexico.

• • •

In the postwar period tentative plans include the manufacture of refrigerators somewhere on the Pacific Coast. Los Angeles is mentioned as a logical site for this purpose and it is interesting to notice the comparison of shipping distances for domestic and export routes as well as freight rates and scheduled delivery of less-car-lot shipment. Such comparisons are presented in the accompanying maps.

This article is the seventh of a series. The concluding installment will appear next week.

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Opposes Cancellation Of Scrap Turnings Rate

Opposing the proposal before the southwestern freight bureau to cancel present freight rates on steel scrap turnings from Houston and Sherman, Tex., to Minnequa, Colo., Keokuk, Iowa, St. Louis and Chicago, a protest has been lodged with the railroads involved by Iron & Steel Products Inc., Chicago. This points out that the proposal is based on an assumption that turnings have the same value as heavy melting steel and that they involve a fire hazard because of the oil included.

The protest adduces proof of error in both assumptions and calls attention to the fact that heavier loading per car is possible and that any type of open equipment can be used, while claims for loss, damage and spoilage are almost nonexistent.

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No. 303— 9"x13½"x4½"—19 Gauge—$ .75 ea.

STYLE 600

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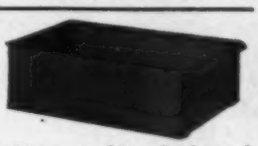

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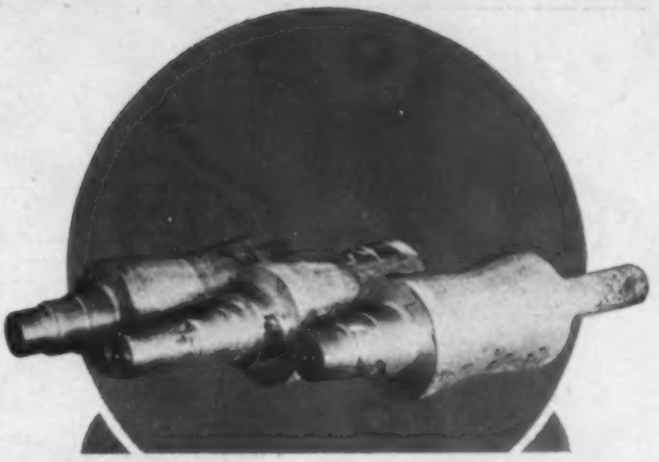

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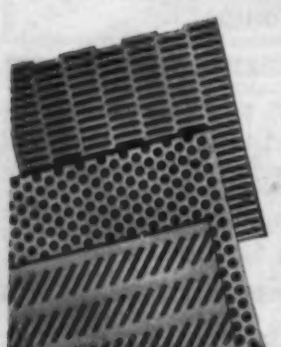

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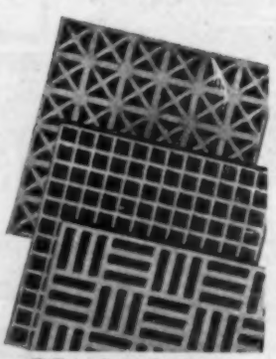

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CONSTRUCTION AND ENTERPRISE

OHIO

BELLEFONTAINE, O.—New York Central, F. J. Jerome, chief engineer, LaSalle street station, Chicago, will rebuild its burned roundhouse and machine shops here, at cost of about $1,000,000.

CLEVELAND—Cleveland Car Screw Co., J. W. Fribley, president, 2917 East Seventy-ninth street, is planning to build an additional factory building to cost about $100,000. H. M. Morse Co., 1500 East Superior avenue, is engineer.

CLEVELAND—Ferbert Schorndorfer Co., paint manufacturer, David Andrew, president, 12815 Elmwood avenue, has plans for a one-story heating plant to cost about $55,000.

NEW HAMPSHIRE

KEENE, N. H.—New England Screw Co., Emerald St., is asking for bids on a brick factory, to cost over $40,000, Waghorne-Brown Co., 44 School street, Boston, engineer.

NEW JERSEY

GARWOOD, N. J.—Aluminum Co. of America, South avenue, has let contract for one-story magnesium foundry addition, to William Blanchard & Co., 45 Poinier street, Newark, to cost $45,000.

PENNSYLVANIA

MCKEESPORT, PA. — National Tube Co., B. C. Colcord, general superintendent, Frick building, McKeesport, has completed sketches for a two-story steel and concrete laboratory building. H. Ottinger, Frick building, McKeesport, is engineer.

ILLINOIS

DIXON, ILL.—Reynolds Co., manufacturer of wire and wire cloth, has let contract to George Lindquist for a one-story factory addition.

WAUKEGAN, ILL.—Johnson Motors, manufacturer of outboard motors, has given contract to Campbell-Lowrie-Lautermilch Corp., 400 West Madison street, Chicago, for a new plant adjacent to its present location. Eschweiler & Eschweiler, 720 East Mason street, Milwaukee, are architects.

MARYLAND

BALTIMORE—Bendix Aviation Corp. has let contract for boiler house and cold storage building, 1450 Key highway, to Davis Construction Co., 9 West Chase street.

BALTIMORE—Frank G. Schenuit Rubber Co. is erecting a one-story, $10,000 plant addition, 3901-51 Clipper road.

PINEY POINT, MD.—Bureau of Yards & Docks, Navy Department, Washington, has let contract to William P. Lipscomb Co., 535 Woodward building, Washington, for construction of electric generating station, Naval Torpedo Testing Range, at $80,791.

GEORGIA

DUBLIN, GA.—Bureau of Yards & Docks, Navy Department, Washington, has let contract to R. D. Cole Mfg. Co., Newnan, Ga., for elevated water tank, Naval hospital, at cost of $28,800.

WARNER ROBINS, GA.—United States Engineer office, Savannah, has awarded contract for construction of a laundry and boiler house to C. M. Guest & Sons, Anderson, S. C., to cost under $100,000.

WARNER ROBINS, GA.—United States Engineer Office, Savannah, has called for bids on construction of a steam generating and distribution system, and heating and steam supply system for laundry at Robins field.

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Holabird & Root, Chicago, are architects-engineers.

TENNESSEE

NASHVILLE—Nashville, Chattanooga & St. Louis railroad is planning to install control tower and control systems from Glencliff to Chattanooga, Tenn.; at cost of about $500,000.

WEST VIRGINIA

BURKELEY CO., W. VA.—United States Engineer Office, War Department, has let contract to Ross Engineering Co., Washington, D. C., for construction of water softening plant and water storage tank, to cost approximately $20,000.

VIRGINIA

PORTSMOUTH, VA.—Bureau of Yards and Docks, Navy Department, Washington, has let contract to Rust Engineering Co., Clark building, Pittsburgh, for alterations and additions to buildings, Norfolk Naval Hospital, to cost $100,450.

WISCONSIN

APPLETON, WIS.—Heinzkill Soap Works has let contract to Al Utschig for a one-story plant addition 50 x 50 feet. E. A. Wettengill is architect.

APPLETON, WIS.—Four Wheel Drive Auto Co., Eagle division, plans construction of an addition to its plant.

BRILLION, WIS.—Brillion Iron Works, manufacturer of pumps, soil pulverizers, etc., will build a one story plant addition 60 x 65 feet. E. A. Wettengill, Appleton, Wis., is architect.

GAY MILLS, WIS.—Kickapoo Lath Co., Jack Whitt, proprietor, has secured quarters for the manufacture of snow fence lath, corn cribs and silos.

GREEN BAY, WIS.—Armour & Co. has let contract to Selmar Co. for a one-story addition to its plant for a cooler building. R. W. Surplice, 1213 Emilie street, is architect.

GREEN BAY, WIS.—Standard Lumber Yards Inc., Elmer Meyer, general manager, has let contract to Selmar Co. for remodeling a one-story warehouse 35 x 155 feet into a lumber mill. Company plans erection of new lumber mill later.

LA CROSSE, WIS.—Bump Pump Co., manufacturer of sanitary and industrial pumps, paper fasteners, etc., plans construction of an addition to present plant. Frank J. Fuchs, 115 South Fourth street, is architect.

MANITOWOC, WIS.—Heresite & Chemical Co., manufacturer of cast resins, coatings, etc., has given contract to Kasper Construction Co. for a 1-story factory addition. Frederick W. Raeuber is architect.

MILWAUKEE—Allis-Chalmers Mfg. Co. has let contract to Meredith Bros. Inc. for a one-story shop building addition at 1126 South Seventieth street.

MISHICOT, WIS.—Western Condensing Co., Appleton, Wis., has let contract to Miron & St. Aubin Construction Co., Appleton for a boiler house here, 40 x 55 feet, and for remodeling a brewery plant into a whey powder plant.

RACINE, WIS.—Harvey Spring & Forging Co., manufacturer of agricultural implements, plans addition to factory.

RACINE, WIS.—Wisconsin Gas & Electric Co. has let contract to Johnson & Henrickson, 422 Dodge street, for plant extension, including three purifying pits, to cost about $125,000.

SHEBOYGAN, WIS.—Northern Furniture Co. has announced plans to invest $750,000 to modernize its plant for plastic and metal stamp work after the war. A new plastic and stamping plant will be built to cover an area of 50,000 square feet. W. C. Weeks, Inc., 720 Ontario avenue, is architect.

TWO RIVERS, WIS.—Kahlenberg Bros. Co., manufacturer of marine engines and similar products, has let contract to Walter W. Oeflein Inc., 5345 North Hopkins street, Milwaukee, for a one-story addition to machine shop.

WAUSAU, WIS.—Marathon Foundry & Machine Co., manufacturer of special machinery, surfacers, etc., has let contract to C. J. Lang for a one-story factory building 60 x 90 feet and 60 x 72 feet. Oppenheimer & Obel are architects.

WEST ALLIS, WIS.—Pioneer Mfg. Co., manufacturer of agricultural implements, has let contract to Madson-Christenson Co., 3613 West National avenue, Milwaukee, for a one-story shop addition.

WEST BEND, WIS. — Gehl Bros. Mfg. Co., 143 Water street, is having plans made by V. H. Esser, 4061 North Prospect avenue, Shorewood, for a two-story brick foundry building 60 x 80 feet.

MINNESOTA

MANKATO, MINN.—Continental Can Co. plans purchase of site for expansion of its Mankato can factory.

MINNEAPOLIS—Dexter Hamilton Co., 707 Central avenue, has been organized to manufacture boxes, millwork, etc. Incorporators are Dexter F. Hamilton, P. T. Hamilton and William R. Collins.

MINNEAPOLIS, MINN.—Flour City Ornamental Iron Co. has given contract to Libbey & Libby Co., 244 Second avenue south, for a 1-story factory addition.

MINNEAPOLIS—The Cornelius Co., manufacturers of beer dispensing equipment, etc., has given contract to Pearson Bros., 2202 Bryant avenue south, for a factory addition.

ST. PAUL—Twin City Testing & Engineering Laboratory, C. W. Britzius, president, has let contract to Hagstrom Construction Co. for a one-story laboratory building 40 x 90 feet. Toltz, King & Day Inc., Pioneer building, is architect and engineer.

TEXAS

DALLAS, TEX.—Guiberson Corp., 2626 Elm street, plans construction of a factory building, including air conditioning and sprinkler system, to cost about $45,000.

HOUSTON, TEX.—J. Edy, city manager, plans sewage disposal plant unit costing about $700,000. J. Fugate and H. E. Elrod, city hall, are consulting engineers.

NORTH DAKOTA

VALLEY CITY, N. DAK.—Northern Pacific Railroad Co. has let contract to M. E. Souther, 1528 Branston street, St. Paul, for a one-story engine house 55 x 100 feet.

IOWA

WATERLOO, IOWA—Lewis Motor Supply Co. has let contract to Jens Olesen & Sons Construction Co., for a one-story machine shop 45 x 52 feet.

WYOMING

RIVERTON, WYO.—Toronto Pipeline Co., affiliate of British-American Oil Producing Co., has received WPB approval for release of needed materials for construction of a 6-inch oil pipeline from Steamboat Butte oilfield to a railpoint at Arapahoe Indian Village. N. A. Ludewick, Tulsa, Okla., general superintendent for the company, will be in charge of construction.

CALIFORNIA

HUNTINGTON PARK, CALIF.—Twig Saw Works, 7400 State street, has been organized by Leo E. Terwilliger and Archibald R. Crosby and will establish a manufacturing business at that address.

LOS ANGELES—B. J. Machine Shop, 5809 South Central avenue, has been formed by Ralph J. Jordan and associates and will conduct a manufacturing business at that address.

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1000 ft.—.118 x 10—7/8 wide
1250 ft.—.197 x 18—1/4 wide
1250 ft.—.197 x 14—5/8 wide
1250 ft.—.197 x 11—3/4 wide
1250 ft.—.197 x 10—7/8 wide

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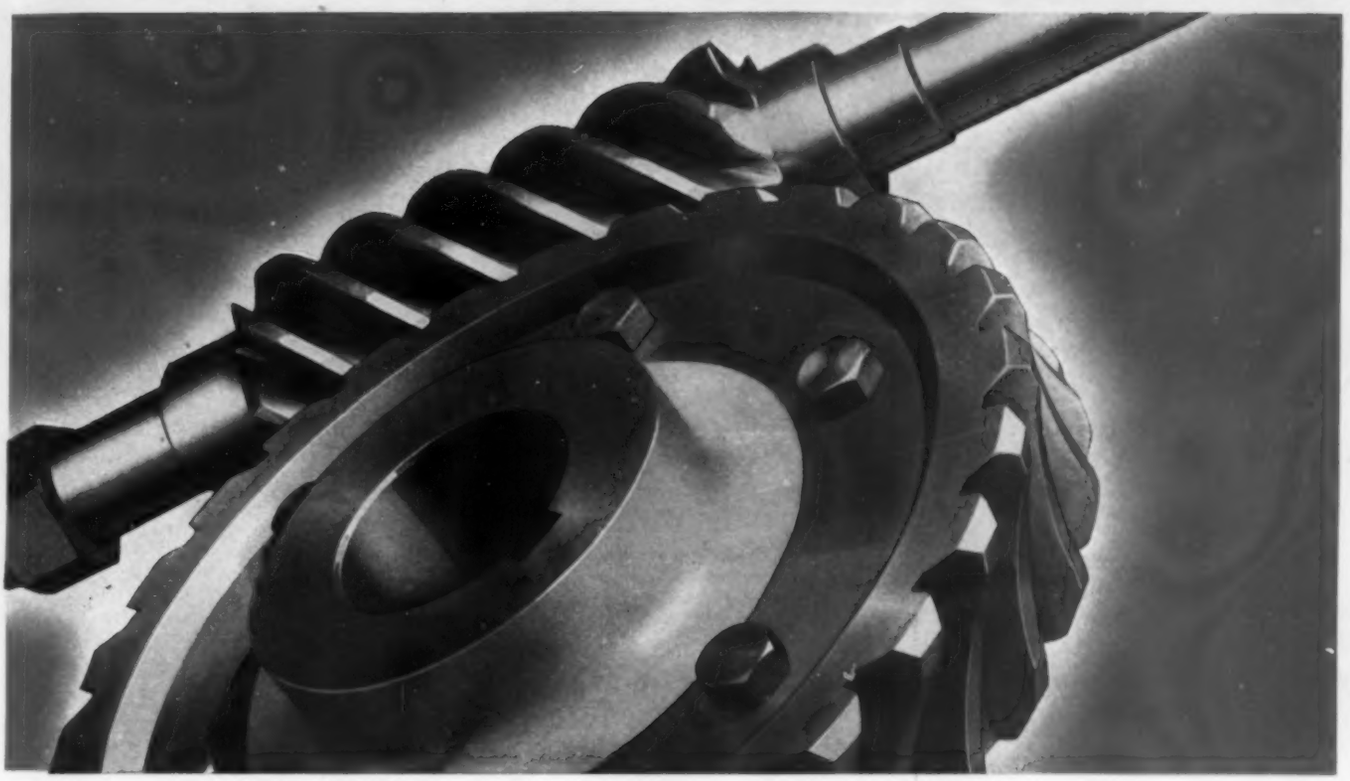
All day today and

all night tonight



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